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Ground Water Basins in California

A Report to the Legislature in Response to Water Code Section 12924

Bulletin 118-80
January 1980

ON THE COVER: The Central Valley of California. Ground water pumped in the Central Valley, about 72 billion litres (19 billion gallons) per day, is equivalent to almost 25 percent of that pumped daily in the entire nation. Today, the decline in water levels in parts of the San Joaquin Valley portion of the Central Valley—resulting from an overdraft of almost 2.5 million cubic dekametres (2 million acre-feet) per year—is causing increased pumping lifts and, consequently, higher energy costs.

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Water Resources
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Huey D. Johnson
Secretary for Resources
The Resources Agency

Edmund G. Brown Jr.
Governor
State of California

Ronald B. Robie
Director
Department of Water Resources

FOREWORD

Ground water management is a major issue in California. The Governor's Commission to Review California Water Rights Law, in its December 1978 report, recommends a new ground water management law for California. During the 1978 and 1979 sessions of the California Legislature, similar bills were introduced but to date the only related legislation enacted was SB 1505 (Nejedly, 1978) which directed the Department to identify the ground water basins of the State, including those subject to critical conditions of overdraft. Basins are to be identified on the basis of geological and hydrological conditions and consideration of political boundary lines whenever practical.

The ground water basin boundaries in this report can provide a basis for ground water management, should the Legislature enact such a program.

New ground water management legislation is needed. While some local agencies are managing ground water effectively with the limited powers available to them, increased authority would permit more extensive local development and implementation of plans for management of the storage space in the underlying ground water basin, ground water extraction, and artificial recharge.

Ground water management is an institutional and a political process. The ground water basin boundaries identified in this report respond in large part to the views of agencies expressed in the workshops and public hearings.

Three hundred fifty seven ground water basins are identified in this report as shown in Bulletin 118, California's Ground Water, 1975. Thirty-seven basin boundaries differ from those in Bulletin 118 (1975). Of these, twenty-two were in accord with local agency comments, and three were selected from among conflicting local comments. Pursuant to Section 10004 of the California Water Code, this report is submitted to the Legislature and shall become part of the California Water Plan.

Ronald B. Robie

Ronald B. Robie, Director
Department of Water Resources
The Resources Agency
State of California

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SUMMARY

Senate Bill 1505, Chapter 601, Statutes of 1978, added Section 12924 to the California Water Code to read:

> "(a) The Department shall in conjunction with public agencies conduct an investigation of the State's ground water basins. The Department shall identify the State's ground water basins on the basis of geological and hydrological conditions and consideration of political boundary lines whenever practical. The Department shall also investigate existing general patterns of ground water pumping and ground water recharge within such basins to the extent necessary to identify basins which are subject to critical conditions of overdraft.
>
> "(b) The Department shall report its findings to the Governor and the Legislature not later than January 1, 1980."

The Department carried out this mandate under the assumption that the Legislature directed the Department to identify ground water basins that would have appropriate boundaries for ground water management purposes.

Local agencies and individuals participated in the investigation in the form of 25 workshops held throughout the State in March and April of 1979,[a/] and four public hearings held in September and October of 1979, after a draft report had been widely circulated. The basis for work on this report was Bulletin 118, California's Ground Water, 1975, which identified ground water basins on geological and hydrological bases.

Figure 1 shows the ground water basins in California for which boundaries are identified in this report. Three hundred fifty seven basins do not differ from those shown in Bulletin 118 (1975). Ground water basins identified as different from those in Bulletin 118 include:

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a/ See Appendix B.

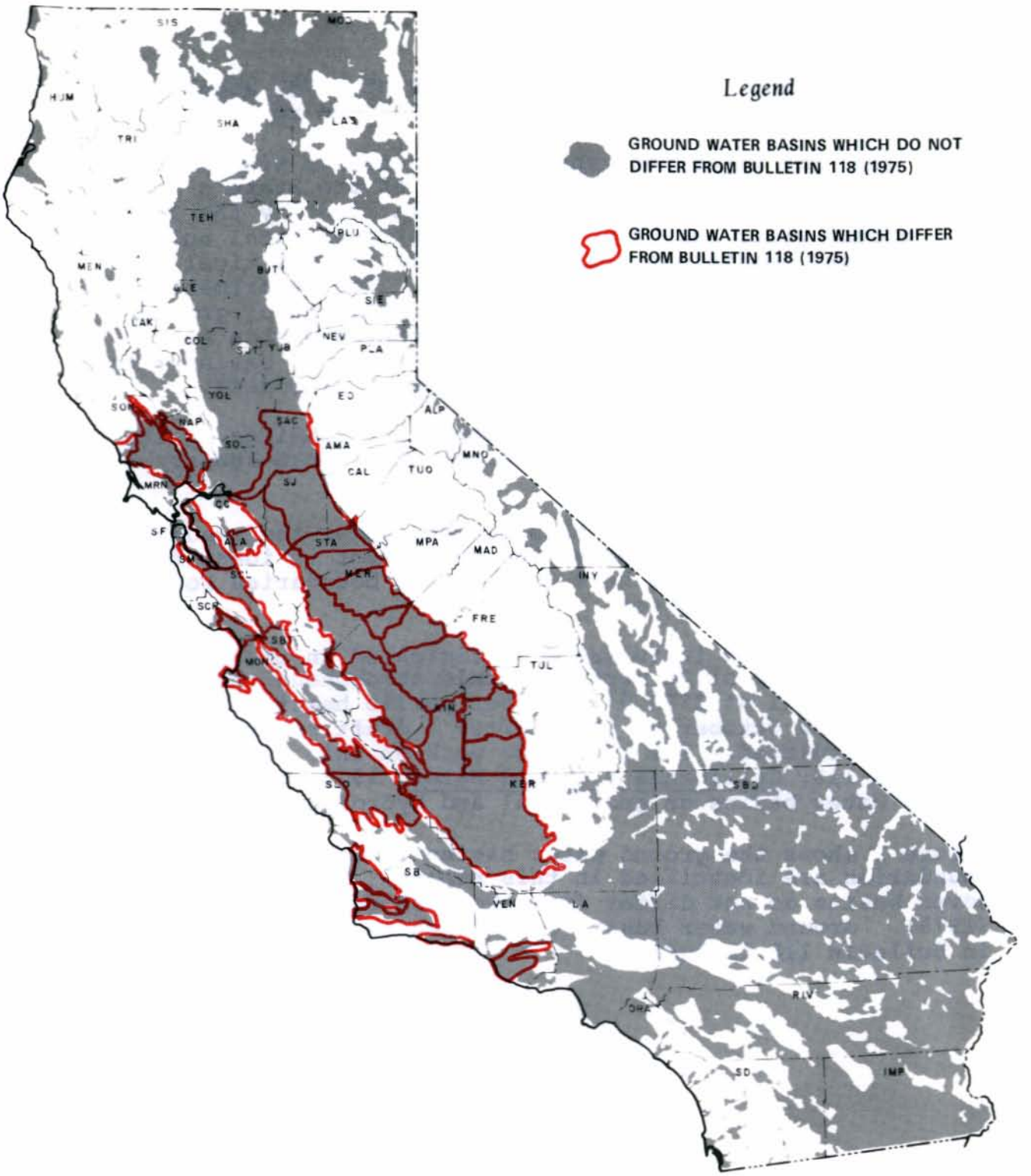

Figure 1. GROUND WATER BASINS IN CALIFORNIA

Napa County Basin
Sonoma County Basin
Santa Clara County Basin
Niles Cone Basin
Livermore Basin
Alameda Bay Plain Basin
San Mateo Basin
Hollister Basin
Santa Cruz-Pajaro Basin
Salinas Basin
Carmel-Seaside Basin
Paso Robles Basin
Santa Maria Basin
San Antonio Basin
Santa Ynez Basin
Goleta Basin
Santa Barbara Basin
Montecito Basin
Carpinteria Basin
Ventura Central Basin
Sacramento County Basin
Eastern San Joaquin County Basin
Tracy Basin
Modesto Basin
Turlock Basin
Merced Basin
Chowchilla Basin
Madera Basin
Delta-Mendota Basin
Kings Basin
Westside Basin
Kaweah Basin
Tulare Lake Basin
Tule Basin
Pleasant Valley Basin
Kern County Basin

The following definition of "subject to critical conditions of overdraft" has been used in this bulletin:

> "A basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts."

Under this definition, eleven basins have been identified as subject to critical conditions of overdraft. The basins are shown on Figure 2 and listed below:

Santa Cruz-Pajaro Basin
Cuyama Valley Basin
Ventura Central Basin
Eastern San Joaquin County Basin
Chowchilla Basin
Madera Basin
Kings Basin
Kaweah Basin
Tulare Lake Basin
Tule Basin
Kern County Basin

Figure 2 also shows four California basins with special problems. Special attention to these basins in the future is warranted because of local concern:

Surprise Valley Basin
Sierra Valley Basin
Long Valley Basin
Owens Valley Basin

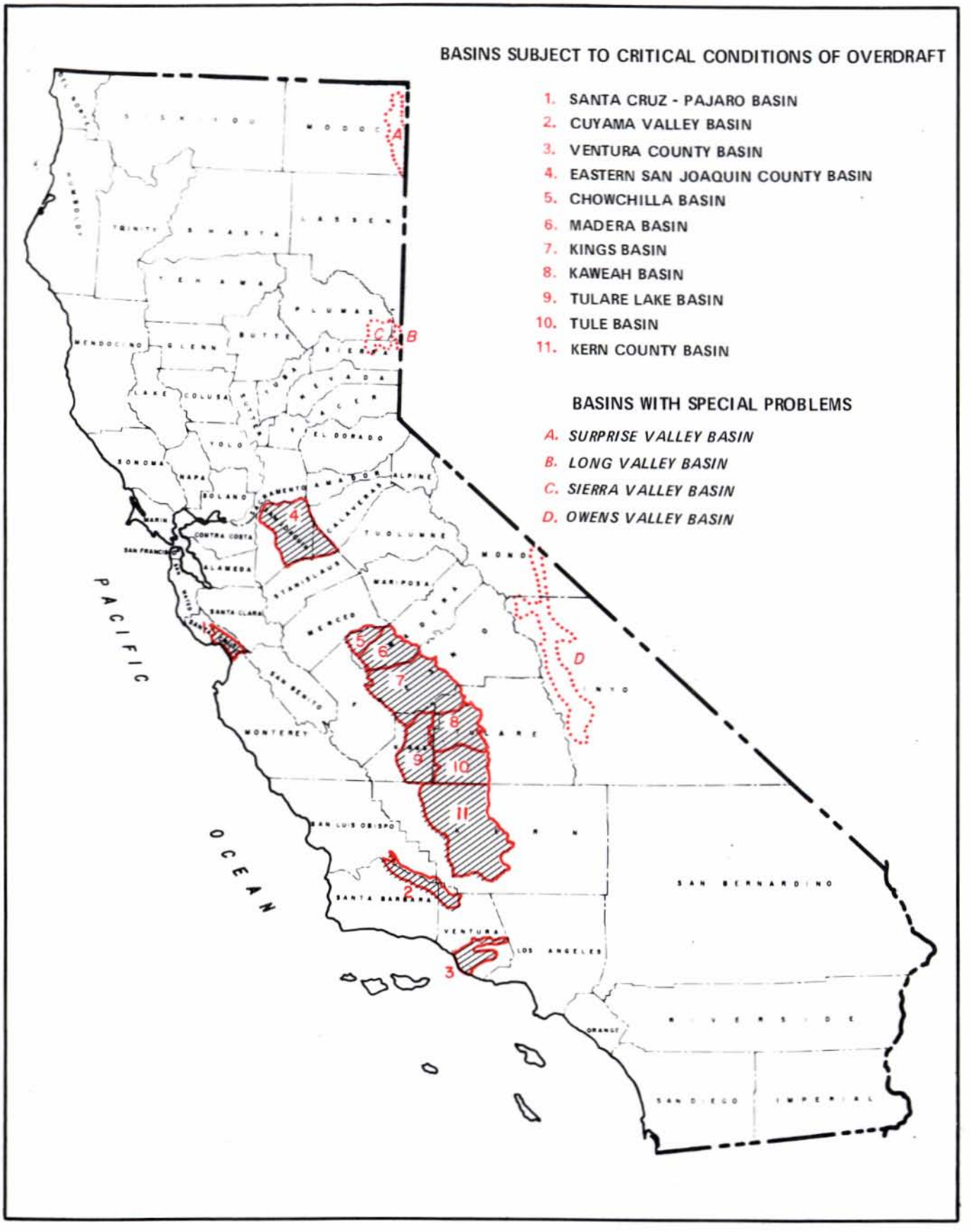

Figure 2. BASINS SUBJECT TO CRITICAL CONDITIONS OF OVERDRAFT OR WITH SPECIAL PROBLEMS

In addition, three special problem areas evolved from the public hearing process. They are:

1. Widespread overdraft in ground water basins that are not identified as subject to critical conditions of overdraft;

2. Special problems of small, primarily coastal ground water basins because of (a) small yield; (b) a tendency to be overdrafted in a very short period of time because of low storage capacity; and (c) the very real possibility that many of the small basins along stream channels near the coast may be considered in a legal sense as underflow of the river rather than as a ground water basin;

3. The water-quality and well-yield problems caused by excessive pumping in some nonbasin, fractured-rock ground water areas, such as the Sierra-Nevada foothills.

CHAPTER 1. THE LAW

This report is in response to Water Code Section 12924 (Chapter 601, Statutes of 1978). Senate Bill 1505 added Section 12924 to the Water Code:

> 12924. (a) The Department shall, in conjunction with other public agencies, conduct an investigation of the State's ground water basins. The Department shall identify the State's ground water basins on the basis of geological and hydrological conditions and consideration of political boundary lines whenever practical. The Department shall also investigate existing general patterns of ground water pumping and ground water recharge within such basins to the extent necessary to identify basins which are subject to critical conditions of overdraft.
>
> (b) The Department shall report its findings to the Governor and the Legislature not later than January 1, 1980.

The important points are: (1) The Department is directed to work in conjunction with other agencies; (2) it is to identify ground water basins of the State on the basis of geological and hydrological conditions with consideration of political boundary lines whenever practical; and (3) it is to identify basins subject to critical conditions of overdraft.

Previous Ground Water Basin Identification

A statewide ground water basin identification was published in 1975 by the Department of Water Resources as Bulletin 118, California's Ground Water, referred to throughout this report as Bulletin 118 (1975).[a/] One of its purposes was to "help those who must make decisions affecting the protection, additional use, and management of the State's ground water resources". Bulletin 118 (1975) contains a summary of technical information on 248 ground water basins in California and maps showing their location and extent. It includes references to 194 Department publications and 185 reports of other agencies.

The Bulletin 118 (1975) basin definition is based on geological and hydrological conditions, with no consideration given to political boundary lines in identifying basins, except where basins had been defined by a court.

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a/ Copies of Bulletin 118 (1975) may be obtained from the California Department of Water Resources for $3.00 each -- make check payable to Department of Water Resources and mail to the Department at P. O. Box 388, Sacramento, California 95802.

Approach to the Investigation

The Department completed the work required by Section 12924 as follows:

(1) discussions of possible basin boundaries and critical basins at workshops in March and April 1979 at 25[b/] locations throughout the State and attended by local agencies and individuals.

(2) preparation of a draft report, which was released in August 1979.

(3) formal public hearings in Los Angeles, Fresno, Redding, and Sacramento in September and October 1979.

(4) preparation of the final report by January 1, 1980.

Definitions

Appendix A contains definitions for most of the technical terms used in this report. Since this report is not highly technical, common definitions of most words are appropriate. However, there are three areas in which special definitions are used: ground water basin, ground water basin management, and subject to critical conditions of overdraft.

Ground Water Basin

In this report the ground water basins are defined on the basis of geological and hydrological conditions and consideration of political boundary lines whenever practical. Since Bulletin 118 (1975) identifies all of the State's basins solely on geological and hydrological bases, the additional purpose of this report is to identify those basin boundaries that reflect political boundaries and, thus, could be used for ground water basin management purposes.

Senator Nejedly, author of SB 1505, in a letter dated October 9, 1979 to the Director of the Department of Water Resources, states that consideration of "political" boundaries was added to the Department's charge to assure that, in the event the Legislature enacts a comprehensive management program, the basins will be logically defined. Senator Vuich reacted in a letter of November 16, 1979, indicating that future ground water management was not her intent in reviewing the bill. The full text of both letters can be found in Appendix D.

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b/ See Appendix B.

This bulletin identifies basin boundaries which differ from Bulletin 118 (1975) where:

(1) a geologically-hydrologically defined basin is too large to manage as a unit;

(2) the ground water basin boundaries had not previously been identified;

(3) new geologic information had become available since Bulletin 118 (1975), or

(4) where management has been initiated.

Special attention was paid to areas in which some ground water basin management had already been initiated or is anticipated.

Ground Water Basin Management

Ground water basin management includes planned use of the ground water basin yield, storage space, transmission capability, and water in storage. It includes (1) protection of natural recharge and use of artificial recharge; (2) planned variation in amount and location of pumping over time; (3) use of ground water storage conjunctively with surface water from local and imported sources; and (4) protection and planned maintenance of ground water quality.

Basins Subject to Critical Conditions of Overdraft

The definition of "subject to critical conditions of overdraft" received more attention in meetings with local agencies and individuals than any other subject. The definition proposed by the Department for discussion in the workshops early in 1979 was:

> "A critical condition of overdraft exists when it is evident that continuation of present water management practices will result in significant negative impacts upon environmental, social, or economic conditions at a local, regional, or State level."

Discussions at the workshops centered on the difficulty in obtaining consistent results in the application of the definition of a critical condition of overdraft; i.e., the definition was not specific enough.

The draft of this Bulletin, issued in August 1979, provided a more specific definition and also indicated that for critical conditions of overdraft to exist, an overdraft must first exist. The more specific definition cited in the draft report was:

"A critical condition of overdraft exists when one or more of the following conditions are causing or threaten to cause significant adverse environmental, social, or economic impacts.

(1) ground water levels receding during a period of normal or above normal water supply;

(2) land subsidence being caused by ground water pumping;

(3) sea water intrusion into the aquifers of a coastal basin;

(4) water of unusable quality being caused to migrate and make existing water supply unusable."

The public hearing record on this particular subject reveals several major issues:

1. Should the word "environmental" be included in the definition? The development of ground water basin yield requires a process which draws water levels down initially. That initial drawdown may stress or kill phreatophyte vegetation; i.e., that vegetation whose roots draw water supply directly from ground water. Those anticipating development of a ground water basin expressed concern that the term "environmental" may prohibit that initial development process. On the other hand, many citizens who indicated concern about the loss of vegetative cover supported the term "environmental" in the definition.

2. Should any definition be included in the final report? Several expressed concern that if a definition is placed in the final report, it could find its way into law in the next few years.

3. Should "overdraft" first exist before a basin can be subject to critical conditions of overdraft? Most agreed that overdraft, as historically defined, should first exist. Some people disagreed on what can be considered an adverse impact of overdraft. In either view, its impact would need to be both adverse and significant to fall within the definition.

4. Should there be a difference between "subject to critical conditions of overdraft" and "in critical conditions of overdraft?" The term "subject to" is interpreted by some as implying a future condition.

The definition adopted for use in this report is:

> "A basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts."

Although local agencies provided a wealth of information and opinion, no alternative suggestions of a specific definition were received at either the workshops or public hearings. No time is specified in the definition, but in all cases it is the judgment of the Department that some change in basin use is required to avoid significant adverse impacts. The adverse impacts do not necessarily occur throughout the entire basin; in fact, water levels may be rising in one portion of the basin, or in one aquifer, even though the basin is in overdraft or subject to critical conditions of overdraft.

CHAPTER 2: GROUND WATER BASIN BOUNDARIES AND CONDITIONS

Three kinds of identifications are contained in this bulletin.

1. The ground water basins in California are identified. Thirty-three basins differ from Bulletin 118 (1975). Most basins do not differ from Bulletin 118 (1975).

2. Eleven basins are identified as subject to critical conditions of overdraft.

3. Special problems are identified in some basins and areas of the State.

Discussion of these three items is presented by hydrologic study area. Figure 3 shows the nine Hydrologic Study Areas of the State.

Special Statewide Problems

Three special statewide problems surfaced as a result of the public hearings. These are:

1. Widespread overdraft in ground water basins of the State that are not identified as subject to critical conditions of overdraft;

2. Special problems of small, primarily coastal ground water basins because of (a) small yield; (b) a tendency to be overdrafted in a very short period of time because of low storage capacity; and (c) the very real possibility that many of the small basins along stream channels near the coast may be considered in a legal sense as underflow of the river rather than as a ground water basin;

3. The water-quality and well-yield problems caused by excessive pumping in some nonbasin, fractured-rock ground water areas, such as the Sierra-Nevada foothills.

Overdraft

There are forty-two ground water basins in which (1) studies have indicated overdraft, or (2) there is evidence of adverse impacts of overdraft. Because such information is important to many considerations of ground water basin management, each basin for which evidence of overdraft could be located is identified in Tables 1 through 9. Each basin so identified is referenced either to Bulletin 118 (1975) or some other source document for evidence that overdraft exists.

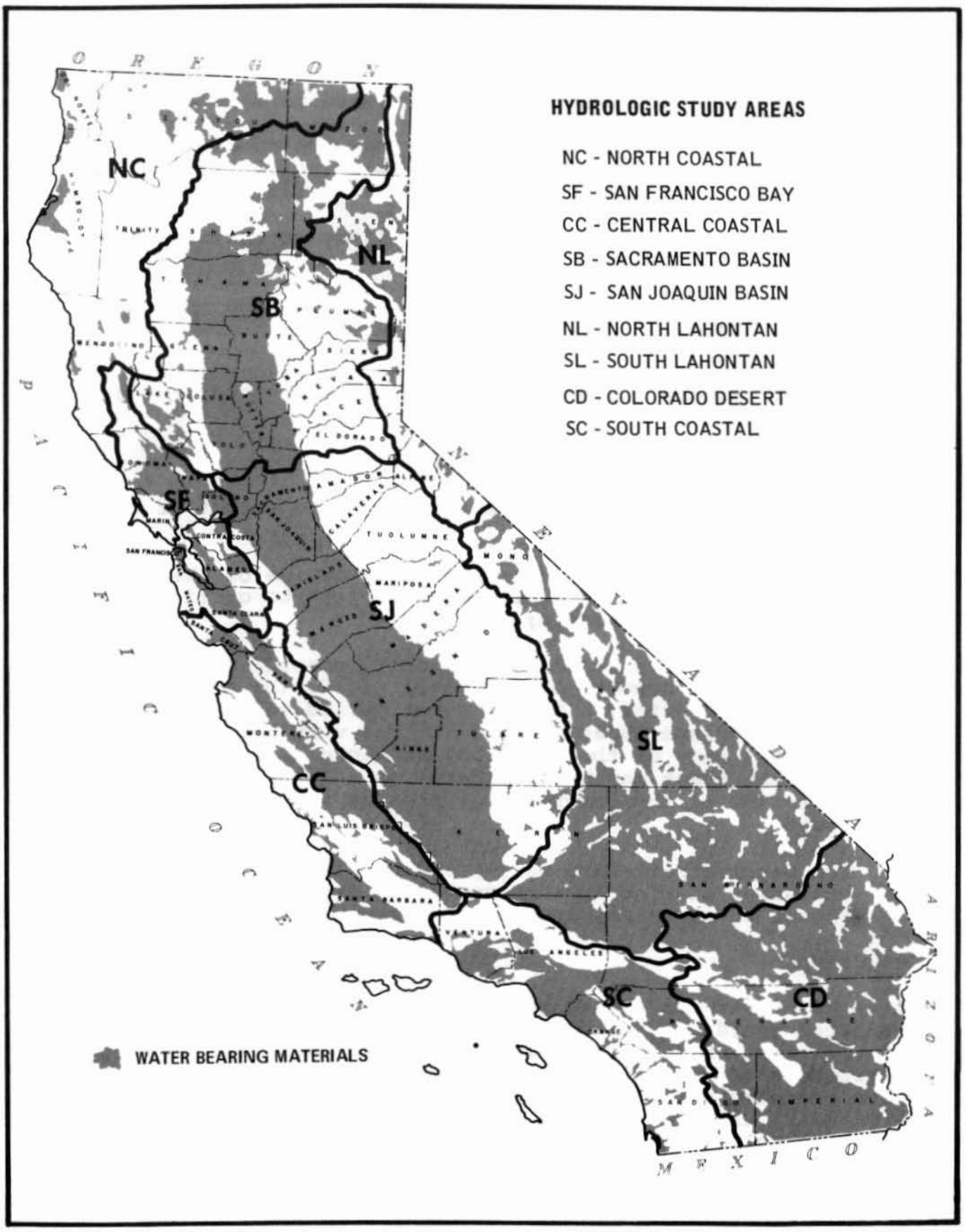

Figure 3. HYDROLOGIC STUDY AREAS

Small Coastal Basins

There are two basic problems with a number of the small coastal basins. First, the average annual long-term dependable water supply is small, because the basins are small. Because of the small amount of storage, an extended drought could deplete such a basin. Local agencies have requested that some small basins be identified as subject to critical conditions of overdraft.

Secondly, many small basins consist of the stream alluvium in a narrow configuration near the stream. Some of these have been considered as "subterranean streams flowing through known and definite channels" under Water Code Section 1200, by the Division of Water Rights of the State Water Resources Control Board. In defining ground water basin boundaries pursuant to Section 12924, distinctions were not made between these narrow basins and other small basins. However, in managing those basins, pumper's water rights administratively recognized by the Board should continue to be recognized.

The concern about the small coastal basins includes that of the California Coastal Commission, whose goal is to protect the quality of the coastal zone environment. In addition, counties and the State Department of Parks and Recreation are creating park areas along the coast, many of which use local ground water as a water supply.

Detailed information is not usually available for such coastal basins. If such basins are to be managed to protect the coastal environment and provide a water supply for recreational and other local activities along the coast, more ground water information should be developed.

Fractured-Rock Ground Water Areas

There are many wells located within the foothills of the Sierras and elsewhere in the State outside the identified ground water basins shown in this report. Ground water is available in most of these areas on a limited basis and has been used extensively for the development of permanent and recreational homesites and some agricultural development. The rapid increase of population in such areas has in some cases resulted in a number of wells that may interfere with each other's water levels and that together would pump more water than the local ground water in rock fractures can provide.

Specific conclusions about ground water availability in such areas are not possible because the open fractures are not always interconnected, and water does not move rapidly from one area to another. In such areas, fractures are not continuous and also become smaller with depth. Even though these areas are not identified as ground water basins in this report, the problem can be a significant one locally.

The Oakhurst area in Madera County is not identified as a ground water basin but is an area where ground water is used as a supply for continued development in the fractured-rock areas of the Sierra Nevada. Well yields are generally low, water quality may be affected by septic tank effluent, and well yields diminish during the late summer months because ground water storage is limited to the cracks and fissures in the underlying formations. Continued development in these areas may pose a future problem due to inadequate and potentially poor-quality water supplies.

North Coastal Hydrologic Study Area

Figure 4 shows the ground water basins identified in the North Coastal Hydrologic Study Area. Table 1 presents the specific basin names keyed to the numbers on the map. There are 49 basins identified in the North Coastal Hydrologic Study Area; 14 of these basins are included in the inventory presented in Bulletin 118 (1975). There is no indication that any of the basins in the North Coastal Hydrologic Study Area are in overdraft.

Ground Water Basin Boundaries

All boundaries in the North Coastal Hydrologic Study Area are the same as those in Bulletin 118 (1975).

Basins Subject to Critical Conditions of Overdraft

No basins in the North Coastal Hydrologic Study Area have been identified as subject to critical conditions of overdraft.

Basins With Special Problems

Coastal Mendocino County is an example of an area where rapid population growth is stressing the limited ground water resources of small basins. Water is also supplied from terrace materials and fractured-rock sources. Widespread overdraft or excessive development is a real possibility and may have already occurred in local areas of intense development, causing a reduced supply in late summer and dry years. Some sea water intrusion has been identified, and pressure for use of the small basins for water supply and recreational development could create overdraft in any one of the coastal basins in a very short period of time.

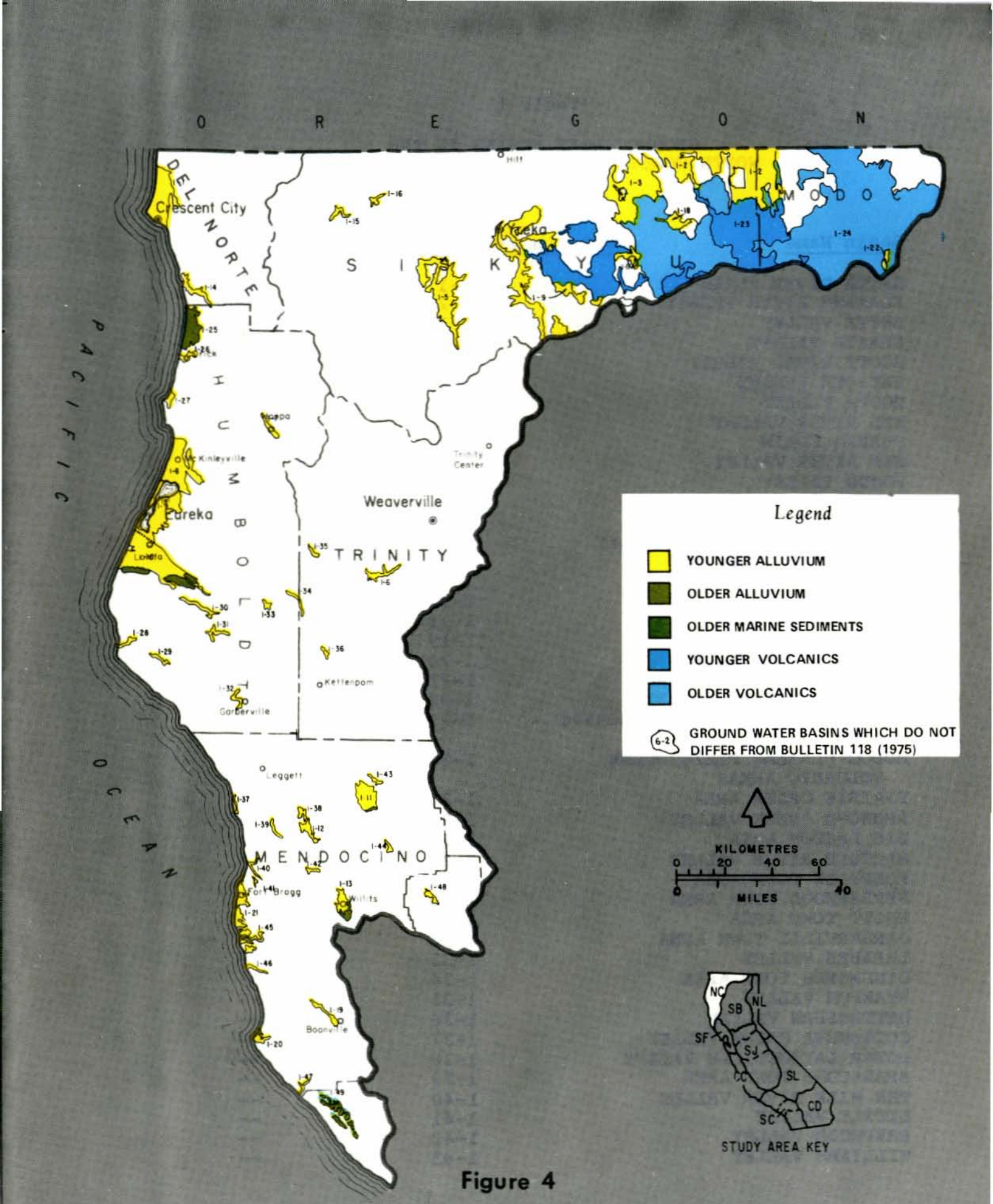

Figure 4

GROUND WATER BASINS - NORTH COASTAL HYDROLOGIC STUDY AREA

Table 1

GROUND WATER BASINS IN THE
NORTH COASTAL HYDROLOGICAL STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
SMITH RIVER PLAIN	1-1	--
KLAMATH RIVER VALLEY	1-2	--
BUTTE VALLEY	1-3	--
SHASTA VALLEY	1-4	--
SCOTT RIVER VALLEY	1-5	--
HAYFORK VALLEY	1-6	--
HOOPA VALLEY	1-7	--
MAD RIVER VALLEY	1-8	--
EUREKA PLAIN	1-9	--
EEL RIVER VALLEY	1-10	--
ROUND VALLEY	1-11	--
LAYTONVILLE VALLEY	1-12	--
LITTLE LAKE VALLEY	1-13	--
LOWER KLAMATH RIVER VALLEY	1-14	--
HAPPY CAMP TOWN AREA	1-15	--
SEIAD VALLEY	1-16	--
BRAY TOWN AREA	1-17	--
RED ROCK VALLEY	1-18	--
ANDERSON VALLEY	1-19	--
GARCIA RIVER VALLEY	1-20	--
FORT BRAGG TERRACE AREA	1-21	--
FAIRCHILD SWAMP VALLEY	1-22	--
MODOC PLATEAU RECENT VOLCANIC AREAS	1-23	--
MODOC PLATEAU PLEISTOCENE VOLCANIC AREAS	1-24	--
PRAIRIE CREEK AREA	1-25	--
REDWOOD CREEK VALLEY	1-26	--
BIG LAGOON AREA	1-27	--
MATTOLE RIVER VALLEY	1-28	--
HONEYDEW TOWN AREA	1-29	--
PEPPERWOOD TOWN AREA	1-30	--
WEOTT TOWN AREA	1-31	--
GARBERVILLE TOWN AREA	1-32	--
LARABEE VALLEY	1-33	--
DINSMORES TOWN AREA	1-34	--
HYAMPOM VALLEY	1-35	--
HETTENSHAW VALLEY	1-36	--
COTTONEVA CREEK VALLEY	1-37	--
LOWER LAYTONVILLE VALLEY	1-38	--
BRANSCOMB TOWN AREA	1-39	--
TEN MILE RIVER VALLEY	1-40	--
LITTLE VALLEY	1-41	--
SHERWOOD VALLEY	1-42	--
WILLIAMS VALLEY	1-43	--

Table 1 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
EDEN VALLEY	1-44	--
BIG RIVER VALLEY	1-45	--
NAVARRO RIVER VALLEY	1-46	--
GUALALA RIVER VALLEY	1-47	--
GRAVELLY VALLEY	1-48	--
ANAPOLIS OHLSON RANCH FORMATION HIGHLANDS	1-49	--

San Francisco Bay Hydrologic Study Area

Figure 5 shows the 30 ground water basins identified in the San Francisco Bay Hydrologic Study Area. These basins are listed in Table 2 with an indication of the two presently considered to be in overdraft. Twenty-six of the basins, or parts of basins, are included in the inventory presented in Bulletin 118.

Ground Water Basin Boundaries

Ground water basin boundaries in the San Francisco Bay Hydrologic Study Area are shown on Figure 5. Seven basins differ from those shown in Bulletin 118 (1975) and 23 have the same boundaries.

Sonoma County Basin - The older and younger alluvium and volcanics of Sonoma County are joined together into a single basin. Local comments suggested termination of the basin at the Marin County line.

Napa County Basin - The older and younger alluvium, marine sediments and volcanics have been combined to form the Napa County Basin.

Santa Clara County Basin - Ground water basin management has been practiced for more than 40 years in the Santa Clara County Basin. There was support for and no objection locally to separation at the San Mateo County line and the Alameda County line to the north. To the south, the workshops and the public hearings considered two different possible southern divisions between the Santa Clara Valley and the Hollister Basin to the south. The Bulletin 118 (1975) boundary was the hydrologic divide between streams draining northward to San Francisco Bay and the Pajaro River draining west to Monterey Bay. Another possible boundary was the county line between Santa Clara and San Benito Counties. Although the choice of boundary was not unanimous, the Department identifies the county line as the

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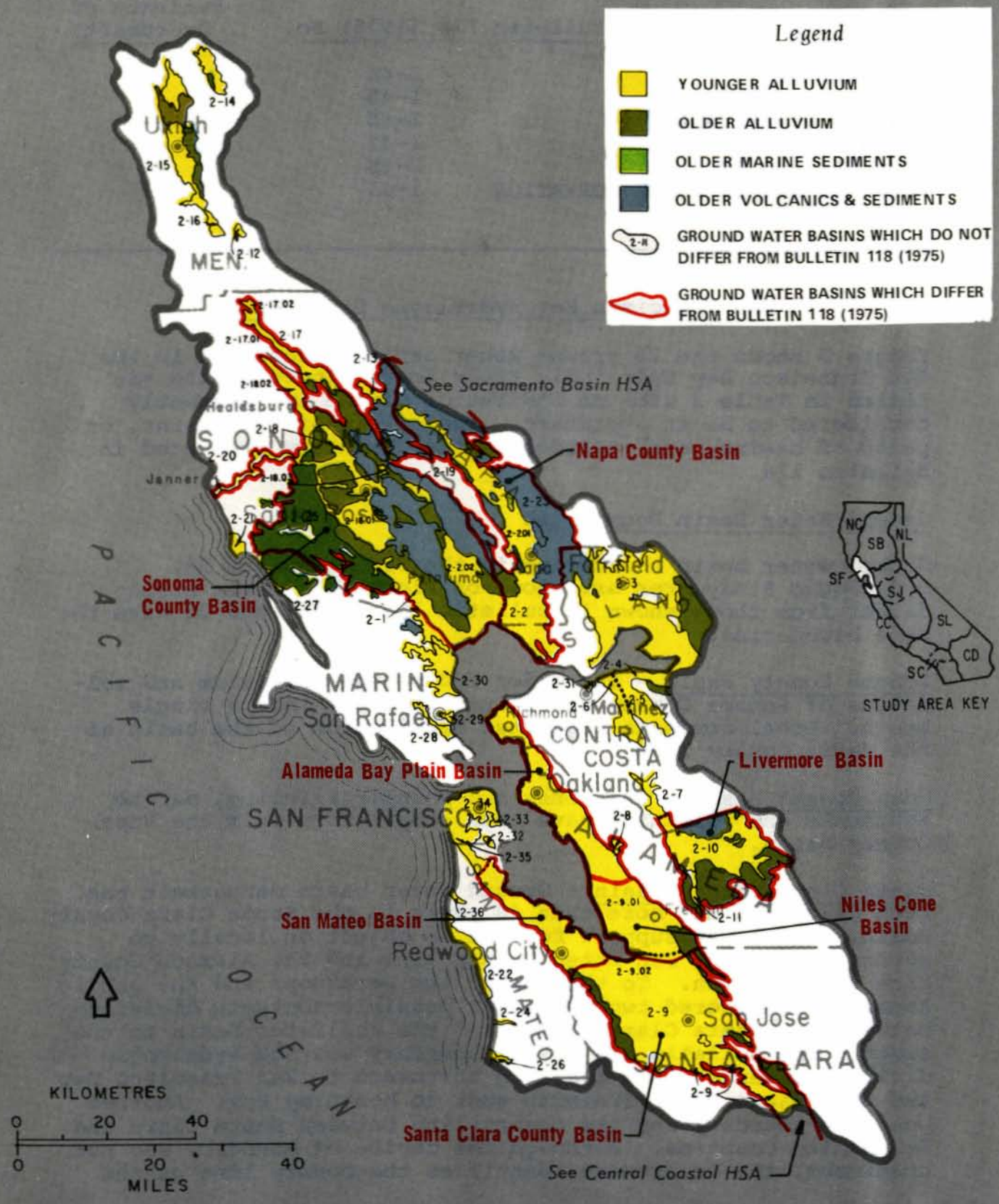

Figure 5

GROUND WATER BASINS-SAN FRANCISCO BAY HYDROLOGIC STUDY AREA

Table 2

GROUND WATER BASINS IN THE
SAN FRANCISCO BAY HYDROLOGIC STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
SONOMA COUNTY BASIN		
Petaluma Valley	2-1	--
Napa-Sonoma Valley (portion)	2-2	--
Sonoma Valley	2-2.02	--
Knights Valley	2-13	--
Alexander Valley	2-17	--
Alexander Area	2-17.01	--
Cloverdale Area	2-17.02	--
Santa Rosa Valley	2-18	--
Santa Rosa Plain	2-18.01	--
Healdsburg Area	2-18.02	--
Rincon Valley	2-18.03	--
Kenwood Valley	2-19	--
Lower Russian River Valley	2-20	--
Napa-Sonoma Volcanics Highlands (portion)	2-23	--
Sebastopol Merced Formation Highlands	2-25	--
NAPA COUNTY BASIN		
Napa-Sonoma Valley (portion)	2-2	--
Napa Valley	2-2.01	--
Napa-Sonoma Volcanics Highlands (portion)	2-23	--
SANTA CLARA COUNTY BASIN		
Santa Clara Valley (portion)	2-9	--
South Bay Area	2-9.02	--
Gilroy-Hollister Valley (portion)	3-3	
SAN MATEO BASIN		
Santa Clara Valley (portion)	2-9	--
ALAMEDA BAY PLAIN BASIN		
Castro Valley	2-8	--
East Bay Area (portion)	2-9.01	--

Table 2 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
NILES CONE BASIN		yes
East Bay Area (portion)	2-9.01	(b)
LIVERMORE BASIN		
Livermore Valley	2-10	--
Sunol Valley	2-11	--
SUISUN-FAIRFIELD VALLEY	2-3	--
PITTSBURG PLAIN	2-4	--
CLAYTON VALLEY	2-5	--
YGNACIO VALLEY	2-6	--
SAN RAMON VALLEY	2-7	--
MACDOWELL VALLEY	2-12	--
POTTER VALLEY	2-14	--
UKIAH VALLEY	2-15	--
SANEL VALLEY	2-16	--
BODEGA BAY AREA	2-21	--
HALF MOON BAY TERRACE	2-22	--
SAN GREGORIO VALLEY	2-24	--
PESCADERO VALLEY	2-26	(b)
SAND POINT AREA	2-27	--
ROSS VALLEY	2-28	--
SAN RAFAEL VALLEY	2-29	--
NOVATO VALLEY	2-30	--
ARROYO DEL HAMBRE VALLEY	2-31	--
VISITATION VALLEY	2-32	--
ISLAIS VALLEY	2-33	--
SAN FRANCISCO SAND DUNE AREA	2-34	--
MERCED VALLEY	2-35	--
SAN PEDRO VALLEY	2-36	--

(b) Water Code Section 12924 Public Hearing Record.

boundary, except that Pacheco Creek alluvium in Santa Clara County becomes part of the Hollister Basin, to recognize the ongoing surface water-ground water management in both counties.

San Mateo Basin - Separation of the bay plain in San Mateo County from Santa Clara County Basin creates this basin.

Niles Cone Basin - The Niles Cone Basin consists of the southern portion of the east bay area bounded on the south by the Alameda-Santa Clara County line and on the north by the boundary of the Alameda County Water District just north of Alvarado.

Alameda Bay Plain Basin - The Alameda Bay Plain Basin contains the remainder of the east bay area and the small contiguous Castro Valley (Bulletin 118 (1975) No. 2-8). It extends from near Alvarado on the south to Richmond on the north.

Livermore Basin - The older and younger sediments in and surrounding the Livermore Valley, including Sunol Valley, are combined to form the Livermore Basin. The Sunol Valley was suggested as a separate basin but is contiguous alluvium. The very narrow stream channel extension of the older alluvium to the east into San Joaquin County has been deleted from the basin at the County line as requested by the local water agency.

Basins Subject to Critical Conditions of Overdraft

None of the basins in the San Francisco Bay Hydrologic Study Area has been identified as subject to critical conditions of overdraft. Severe overdraft has existed in the past in some basins, but local water agencies have imported additional water, recharged the basins, and are utilizing ground water storage and yield within an overall ground water management plan.

Basins With Special Problems

An example of a small coastal basin with a special problem is the Pescadero Valley Basin on the coast just south of San Francisco. San Mateo County requested in the public hearing record that this basin be identified as subject to critical conditions of overdraft. The small coastal basin consists of an eight square mile area for which there is only superficial knowledge of geology, hydrology and water quality. Earlier studies indicate a moderate level of development for irrigation, domestic, and stock use, and sea water intrusion was indicated in samples taken in 1970. The small storage space, with its attendant ability to become overdrafted in a short period of time, makes this valley a prime example of the problems of "small coastal basins".

Central Coastal Hydrologic Study Area

Figure 6 shows the 40 ground water basins identified in the Central Coastal Hydrologic Study Area. Twenty-two of the basins or parts of basins are covered in the inventory presented in Bulletin 118 (1975). Table 3 indicates that ten basins are considered to be in overdraft now.

Ground Water Basin Boundaries

Ground water basin boundaries in the Central Coastal Hydrologic Study Area are shown on Figure 6. The Santa Clara County Basin extends southward into this hydrologic study area to the San Benito County line from the San Francisco Bay Hydrologic Study Area.

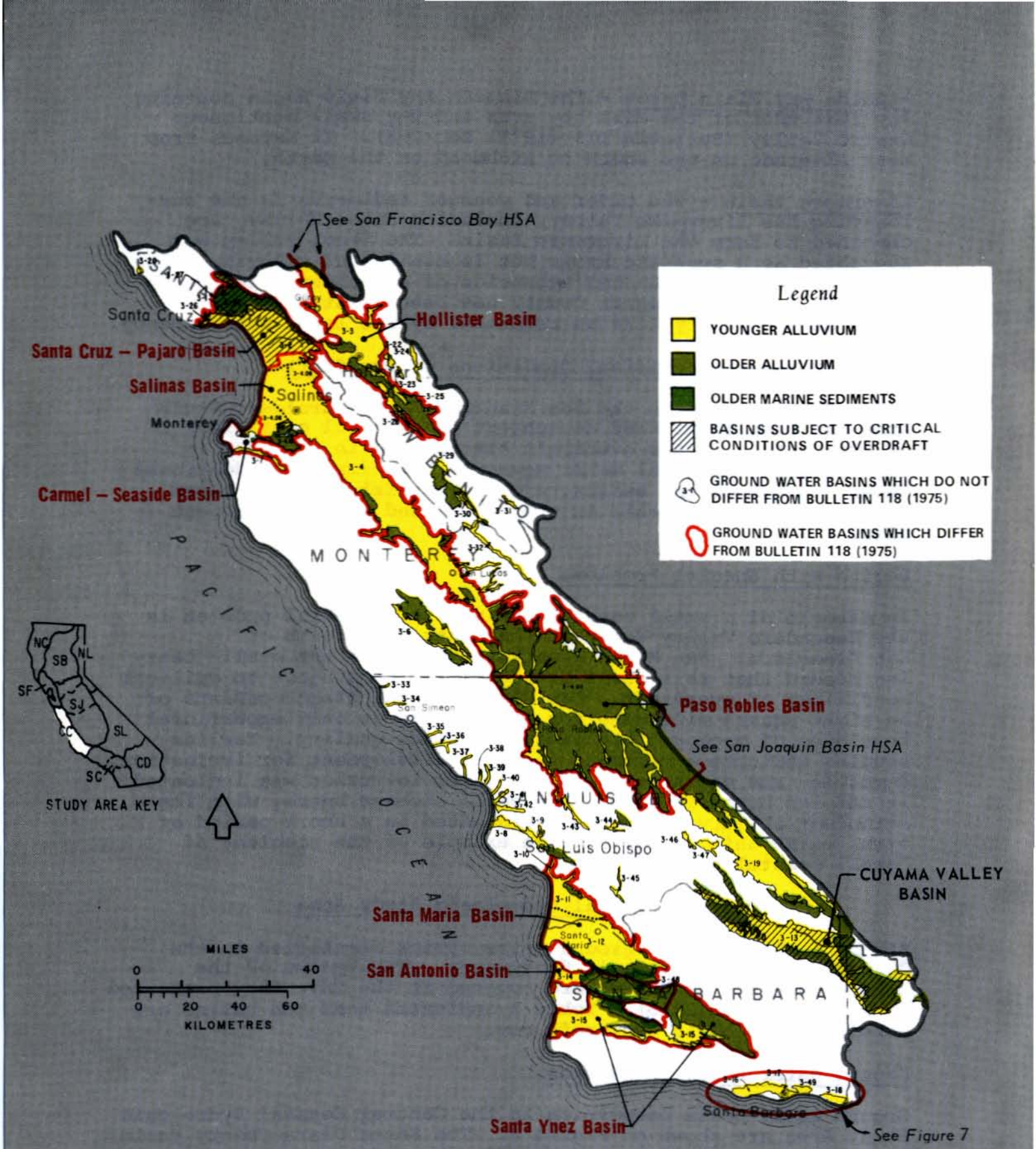

Figure 6

GROUND WATER BASINS - CENTRAL COASTAL HYDROLOGIC STUDY AREA

Table 3

GROUND WATER BASINS IN THE
CENTRAL COASTAL HYDROLOGIC STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
SANTA CRUZ-PAJARO BASIN		yes
Soquel Valley	3-1	--
Pajaro Valley (portion)	3-2	(a)
Santa Cruz Purisima Formation Highlands	3-21	--
West Santa Cruz Terrace	3-26	--
Scotts Valley	3-27	--
SALINAS BASIN		yes
Pajaro Valley (portion)	3-2	(a)
Salinas Valley (portion)	3-4	(a)
Paso Robles (portion)	3-4.06	--
Seaside Area (portion)	3-4.08	--
Langley Area	3-4.09	--
Corral de Tierra Area	3-4.10	--
Cholame Valley (portion)	3-5	--
HOLLISTER BASIN		yes
Gilroy-Hollister Valley	3-3	(a)
Tres Pinos Valley	3-25	--
San Benito River Valley	3-28	--
CARMEL-SEASIDE BASIN		yes
Salinas Valley (portion)	3-4	(a)
Seaside Area (portion)	3-4.08	--
Carmel Valley	3-7	--
PASO ROBLES BASIN		yes
Paso Robles Basin (portion)	3-4.06	(b)
Cholame Valley (portion)	3-5	--
SANTA MARIA BASIN		yes
Pismo Creek Valley	3-10	--
Arroyo Grande Valley-Nipomo Mesa Area	3-11	(c)
Santa Maria River Valley	3-12	(a)

Table 3 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
SAN ANTONIO BASIN		yes
San Antonio Creek Valley	3-14	(b)
Careaga Sand Highlands (portion)	3-48	--
SANTA YNEZ BASIN		yes
Santa Ynez River Valley	3-15	(b)
Careaga Sand Highlands (portion)	3-48	--
GOLETA BASIN		yes
Goleta Basin	3-16	(b)
SANTA BARBARA BASIN		
Santa Barbara Basin	3-17	--
MONTECITO BASIN		
Montecito Area	3-49	--
CARPINTERIA BASIN		
Carpinteria Basin	3-18	--
LOCKWOOD VALLEY	3-6	--
LOS OSOS VALLEY	3-8	--
SAN LUIS OBISPO VALLEY	3-9	--
CUYAMA VALLEY BASIN	3-13	(a,b)
CARRIZO PLAIN	3-19	--
ANO NUEVO AREA	3-20	--
SANTA ANA VALLEY	3-22	--
UPPER SANTA ANA VALLEY	3-23	--
QUIEN SABE VALLEY	3-24	--
DRY LAKE VALLEY	3-29	--
BITTER WATER VALLEY	3-30	--
HERNANDEZ VALLEY	3-31	--
PEACH TREE VALLEY	3-32	--
SAN CARPOFORO VALLEY	3-33	--
ARROYO de la CRUZ VALLEY	3-34	--
SAN SIMEON VALLEY	3-35	--
SANTA ROSA VALLEY	3-36	--
VILLA VALLEY	3-37	--
CAYUCOS VALLEY	3-38	--
OLD VALLEY	3-39	--
TORO VALLEY	3-40	--
MORRO VALLEY	3-41	--

Table 3 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
CHORRO VALLEY	3-42	--
RINCONADA VALLEY	3-43	--
POZO VALLEY	3-44	--
HUASNA VALLEY	3-45	--
RAFAEL VALLEY	3-46	--
BIG SPRING AREA	3-47	--

(a) See Bulletin 118 (1975).

(b) Water Code Section 12924, public hearing record.

(c) DWR District Report, "Ground Water in the Arroyo Grande Area," June 1979.

Hollister Basin - The younger and older alluvium of San Benito County are combined with the Pacheco Creek alluvium of Santa Clara County to form the Hollister Basin. The political boundary at the north end of the Hollister Basin is not a geologic boundary and ground water flows southward across it. There is both local opposition and support for the boundary.

Santa Cruz-Pajaro Basin - The Santa Cruz-Pajaro Basin is separated from the Salinas Valley along a submarine canyon extension of Elkhorn Slough, which is backfilled with clay and forms a ground water restriction: then eastward to the Vergalis Fault and to the foothills. This boundary is not precisely the watershed divide between the Pajaro River and the Salinas River but does form the best physical boundary possible between the two basins. While the county line between Santa Cruz and Monterey Counties could have provided a political boundary in this case, there was sufficient local objection to that proposal that the physical boundary was selected.

Carmel-Seaside Basin - The Carmel-Seaside Basin covers the Carmel River, a portion of the older and younger alluvium at the southern edge of the Salinas Valley, south of Fort Ord, and the nonwater-bearing highland area between the two. The boundaries coincide with the Monterey Peninsula Water Management District. The northern boundary is limited by Fort Ord.

Salinas Basin - The Salinas Basin is bounded on the northern end by the Santa Cruz-Pajaro Basin, the Carmel-Seaside Basin and Monterey Bay. It includes all the younger and older alluvium contiguous to the Salinas River southerly to the county line between Monterey and San Luis Obispo Counties. This southern boundary occurs primarily through older alluvium, which is less permeable and therefore less of a problem as a ground water management boundary.

Paso Robles Basin - The Paso Robles Basin is bounded on the north by the Monterey County line and the southern boundary of the Salinas Basin. It extends southward to the topographic divide near the northern edge of the Carizzo Plain and includes both older and younger alluvium.

Santa Maria, San Antonio, and Santa Ynez Basins - Bulletin 118 (1975) presents a series of contiguous older and younger alluvium from Basin 3-11 on the north through Basin 3-15 on the south and eastward to include some additional identified ground water storage areas. This combined older and younger alluvium is divided into three ground water basins.

The Santa Maria Basin includes the Santa Maria Valley, Nipomo Mesa, and Arroyo Grande Valley. In Bulletin 118 (1975), the northern boundary of the Santa Maria River Valley was a surface escarpment and was thought to have an underground expression. However, recent geologic findings indicate that there is no subsurface barrier to ground water and leads to the combination of the units to form the larger Santa Maria Basin.

A possible division of the Santa Maria Basin along the county line between San Luis Obispo County and Santa Barbara County was reviewed. The natural ground water flow pattern is from the southeast to the northwest, with large amounts of ground water underflow at the county line. Because of the size of the basin and the absence of a subsurface barrier at the County line, it is not so subdivided.

The San Antonio Basin consists of the younger alluvium near the coast and the adjacent older alluvium to the east. Division on both the north and south is through the older, less-permeable alluvium along the topographic divides.

The Santa Ynez Basin includes the younger alluvium near the coast, the older alluvium inland, and the additional younger alluvium inland. The boundaries of the Santa Ynez River Water Conservation District and the proposed Santa Ynez Basin were compared. The District excludes some older alluvium to the north of the River. For ground water management purposes the older alluvium should be included. Along the southern edge of the basin, where the Santa Ynez River weaves through younger alluvium, this stretch of stream is considered locally as underflow of the stream rather than as a ground water basin. Ground water management will have to accommodate any valid water rights.

Goleta, Santa Barbara, Montecito, and Carpinteria Basins - There was strong local support for delineating the dividing lines between the first three basins which, although separately identified in Bulletin 118 (1975), were not actually divided on the maps. Recommended boundaries for all four basins are also based on new geologic knowledge. They are shown on Figure 7 at a large enough scale to see that the recommended boundaries coincide with the water district and city boundaries.

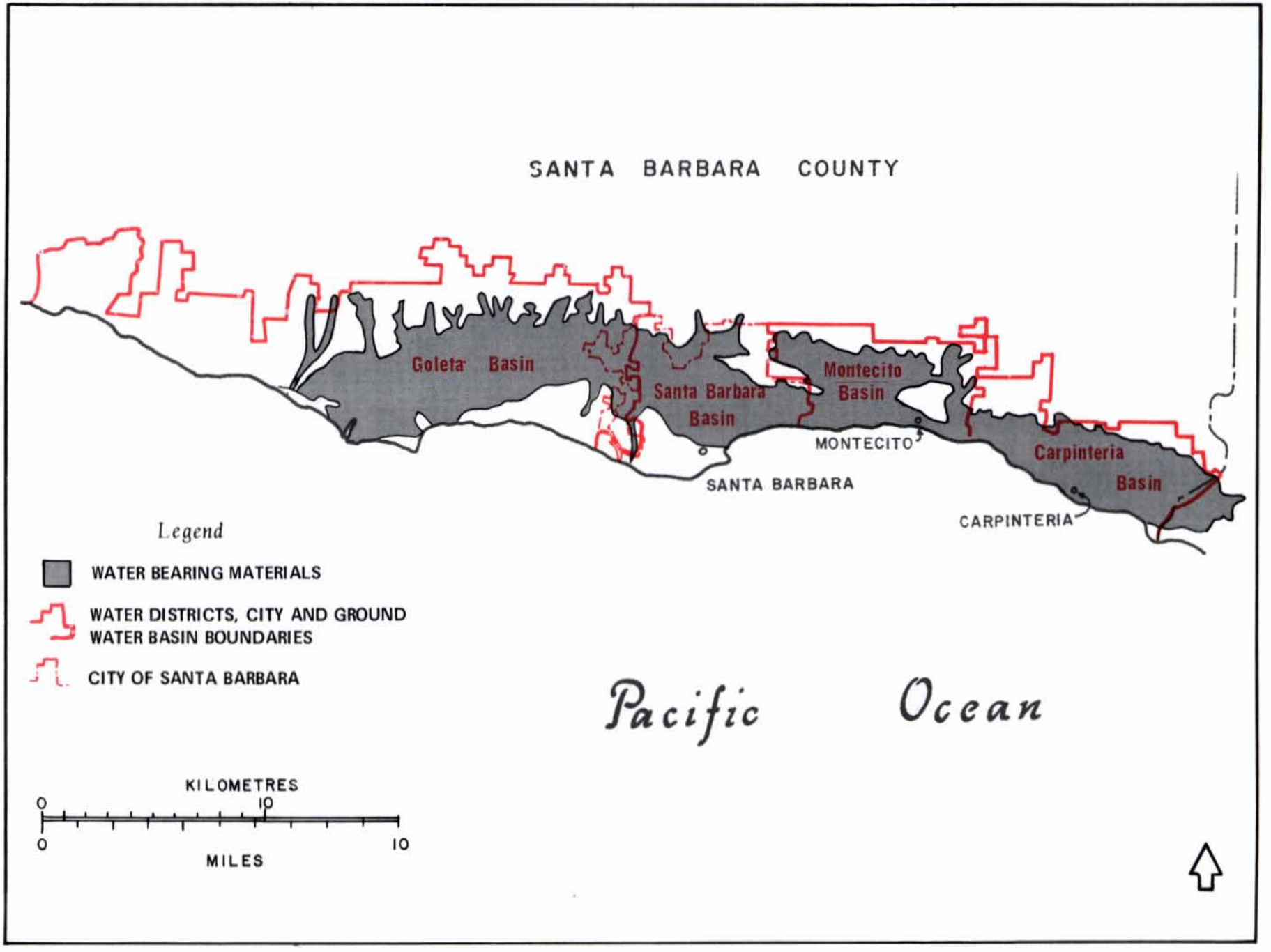

Figure 7 GROUND WATER BASINS IN SOUTHERN SANTA BARBARA COUNTY

Basins Subject to Critical Conditions of Overdraft

Two basins in the Central Coastal Hydrological Study Area are identified as subject to critical conditions of overdraft.

Santa Cruz-Pajaro Basin - At the request of the City of Santa Cruz and a Supervisor of Santa Cruz County the basin has been identified as subject to critical conditions of overdraft. The overdraft has been computed, from hydrologic studies by the U. S. Geological Survey, as 21 000 cubic dekametres (17,000 acre-feet) per year. Sea water intrusion has been in evidence for a number of years along the Monterey Bay coast line.

Cuyama Valley Basin - The Cuyama Valley Basin is an isolated valley located in the northeast corner of Santa Barbara County and adjacent portions of San Luis Obispo, Kern, and Ventura Counties.

The alluvial plain that forms the main part of the 370 square-kilometre (230 square-mile) basin is 6 to 10 kilometres (4 to 6 miles) wide. Streams flow only from November through April and rainfall averages about 150 millimetres (6 inches) a year. Use of water for irrigation has increased from 1 230 cubic dekametres (1,000 acre-feet) in 1939 to a current 67 000 cubic dekametres (54,000 acre-feet). It is anticipated that the current amounts will be sustained until pumping lifts make pumpage uneconomical. Total urban and suburban development covers less than 400 hectares (1,000 acres).

Historic ground water levels in the eastern valley have not changed significantly; however, those in the central and western portions have declined from 15 to 60 metres (50 to 200 feet) since 1950. During 1947 to 1966, the estimated decrease in ground water in storage was 555 000 cubic dekametres (450,000 acre-feet) with an additional loss of 308 000 cubic dekametres (250,000 acre-feet) from 1966 to 1978.

Natural recharge in Cuyama Valley falls far short of extraction, evapotranspiration, and outflow, and continual decline of ground water levels is anticipated. Because of its remoteness, small population, and the consequent small financial base, no sound alternatives for stemming this declining trend short of adjudication are apparent. Importation of water from distant sources for agricultural use appears to be beyond the payment capacity of crops currently raised or suitable to the area.

Basins With Special Problems

Small coastal basins of Santa Barbara and San Luis Obispo Counties are typical of those described earlier. Chorro and Morro Basins in particular were mentioned by letter at the

time of the public hearings. The four basins on the southern coast of Santa Barbara County were discussed at the public hearings: Goleta, Santa Barbara, Montecito, and Carpenteria Basins.

South Coastal Hydrologic Study Area

Figure 8 presents the 58 ground water basins identified in the South Coastal Hydrologic Study Area. Table 4 lists those basins and indicates six basins which are considered to be in overdraft. The Bulletin 118 (1975) inventory covers 42 ground water basins.

Ground Water Basin Boundaries

The combination of four areas separately identified in Bulletin 118 (1975) into one basin constitutes the only difference from Bulletin 118 (1975) in the South Coastal Hydrologic Study Area.

Ventura Central Basin - The four valleys identified in Bulletin 118 (1975) as the Santa Clara River Valley, Pleasant Valley, Arroyo Santa Rosa Valley, and Las Posas Valley are contiguous and hydrologically continuous. Bulletin 118 (1975) separated these areas of mixed younger and older alluvium and volcanic deposits on the basis of surface water drainage. Ground water moves into the Santa Clara River Valley from the other three valleys, particularly into the Oxnard Plain.

The Department combines these four valleys into one basin called the Ventura Central Basin.

Basins Subject to Critical Conditions of Overdraft

Only one basin in the South Coastal Hydrologic Study Area is presently identified as subject to critical conditions of overdraft.

Ventura Central Basin - An area of about 5 200 hectares (13,000 acres) of the upper aquifer of the two-aquifer system is thought to be intruded by seawater as a result of pumpage exceeding replenishment for more than 20 years. The Oxnard aquifer is separated from the lower aquifer by a clay layer and is the main producer. The estimated overdraft in 1970 was 81 000 cubic dekametres (66,000 acre-feet).

High mineral concentrations are also found in the ground water of the upper aquifer. The total dissolved solids (TDS) concentration of water in the upper aquifer range from 1,000 to 2,000 mg/l. These high concentrations are mainly due to agricultural activities.

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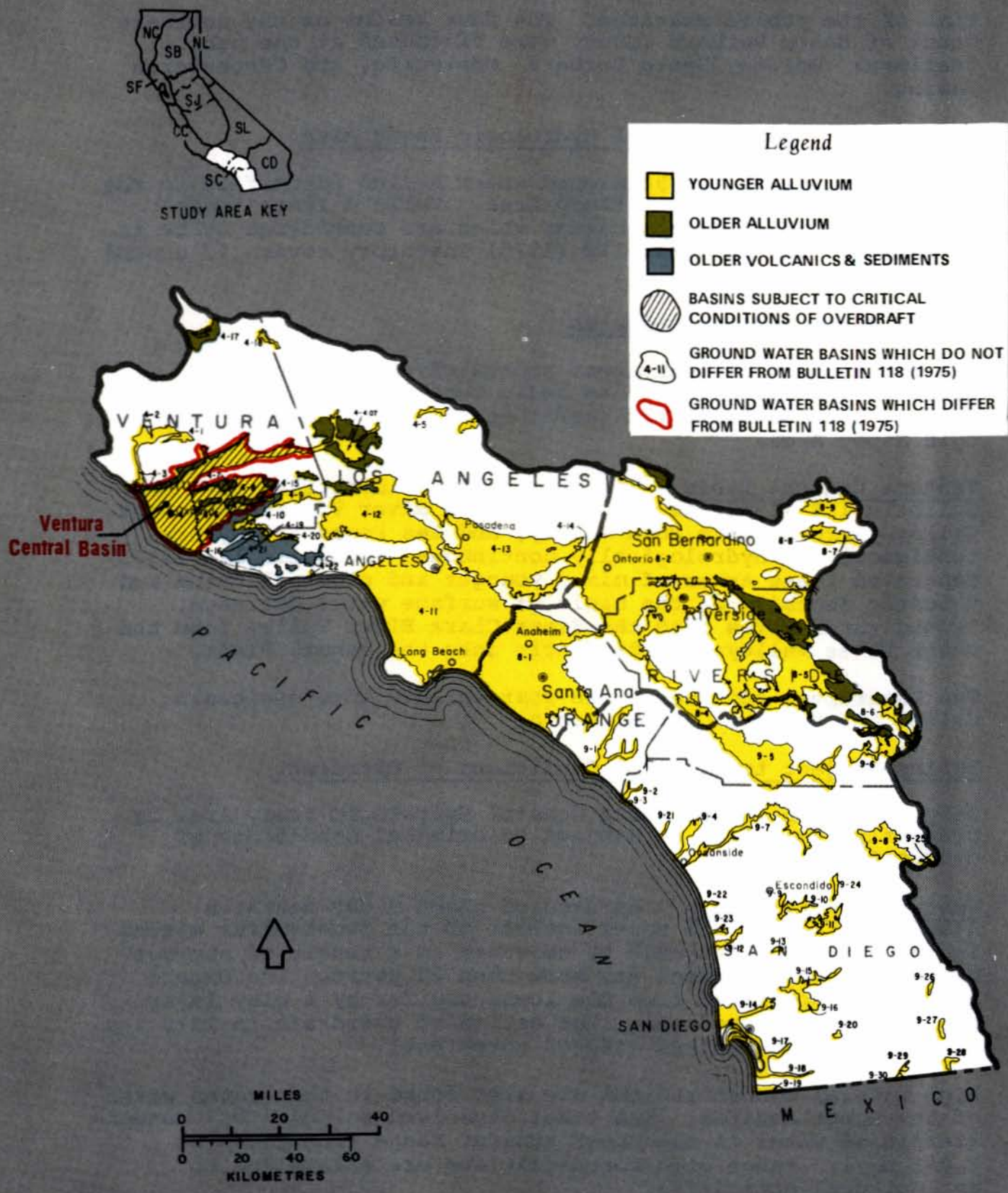

Figure 8

GROUND WATER BASINS - SOUTH COASTAL HYDROLOGIC STUDY AREA

Table 4

GROUND WATER BASINS IN THE
SOUTH COASTAL HYDROLOGIC STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
VENTURA CENTRAL BASIN		yes
Santa Clara River Valley	4-4	(a)
Pleasant Valley	4-6	(c)
Arroyo Santa Rosa Valley	4-7	--
Las Posas Valley	4-8	--
UPPER OJAI VALLEY	4-1	--
OJAI VALLEY	4-2	--
VENTURA RIVER VALLEY	4-3	--
SANTA CLARA RIVER VALLEY EASTERN BASIN	4-4.07	--
ACTON VALLEY	4-5	--
SIMI VALLEY	4-9	--
CONEJO VALLEY	4-10	--
COASTAL PLAIN OF LOS ANGELES COUNTY	4-11	--
SAN FERNANDO VALLEY	4-12	--
SAN GABRIEL VALLEY	4-13	--
UPPER SANTA ANA VALLEY	4-14	--
TIERRA REJADA	4-15	--
HIDDEN VALLEY	4-16	--
LOCKWOOD VALLEY	4-17	--
HUNGRY VALLEY	4-18	--
THOUSAND OAKS AREA	4-19	--
RUSSELL VALLEY	4-20	--
CONEJO-TIERRA REJADA VOLCANIC AREAS	4-21	--
MALIBU VALLEY	4-22	--
COASTAL PLAIN OF ORANGE COUNTY	8-1	--
UPPER SANTA ANA VALLEY	8-2	--
ELSINOR BASIN	8-4	(a)
SAN JACINTO BASIN	8-5	(a)
HEMET LAKE VALLEY	8-6	
BIG MEADOWS VALLEY	8-7	--
SEVEN OAKS VALLEY	8-8	--
BEAR VALLEY	8-9	--
SAN JUAN VALLEY	9-1	--
SAN MATEO VALLEY	9-2	--
SAN ONOFRE VALLEY	9-3	--
SANTA MARGARITA	9-4	(a)
TEMECULA VALLEY	9-5	--
COAHUILA VALLEY	9-6	--
SAN LUIS REY VALLEY	9-7	(a)
WARNER VALLEY	9-8	--

Table 4 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
ESCONDIDO VALLEY	9-9	--
SAN PASQUAL VALLEY	9-10	--
SANTA MARIA VALLEY	9-11	--
SAN DIEGUITO VALLEY	9-12	--
POWAY VALLEY	9-13	--
MISSION VALLEY	9-14	--
SAN DIEGO RIVER VALLEY	9-15	--
EL CAJON VALLEY	9-16	--
SWEETWATER VALLEY	9-17	--
OTAY VALLEY	9-18	--
TIA JUANA BASIN	9-19	(a)
JAMUL VALLEY	9-20	--
LAS PULGAS	9-21	--
BATIQUITOS LAGOON VALLEY	9-22	--
SAN ELIJO VALLEY	9-23	--
PAMO VALLEY	9-24	--
RANCHITA TOWN VALLEY	9-25	--
PINE VALLEY	9-26	--
COTTONWOOD VALLEY	9-27	--
CAMPO VALLEY	9-28	--
POTRERO VALLEY	9-29	--
TECATE VALLEY	9-30	--

(a) See Bulletin 118 (1975).

(c) See Bulletin 104-8: "Planned Utilization of Water Resources in Ventura County," November 1976.

Basins With Special Problems

Many small coastal ground water basins in San Diego and Orange Counties are typical of those described earlier. No individual basin in the South Coastal Hydrologic Study Area was identified in the public hearing process.

Sacramento Basin Hydrologic Study Area

Figure 9 presents the 63 ground water basins in the Sacramento Basin Hydrologic Study Area. Twenty-four of these basins are covered in the inventory presented in Bulletin 118 (1975). Table 5 indicates that two of the basins show evidence of overdraft.

Ground Water Basin Boundaries

The only basin boundary identified in the Sacramento Basin Hydrologic Study Area that differs from Bulletin 118 (1975) is a separation of Sacramento County from the Sacramento Valley, thereby creating the Sacramento County Basin.

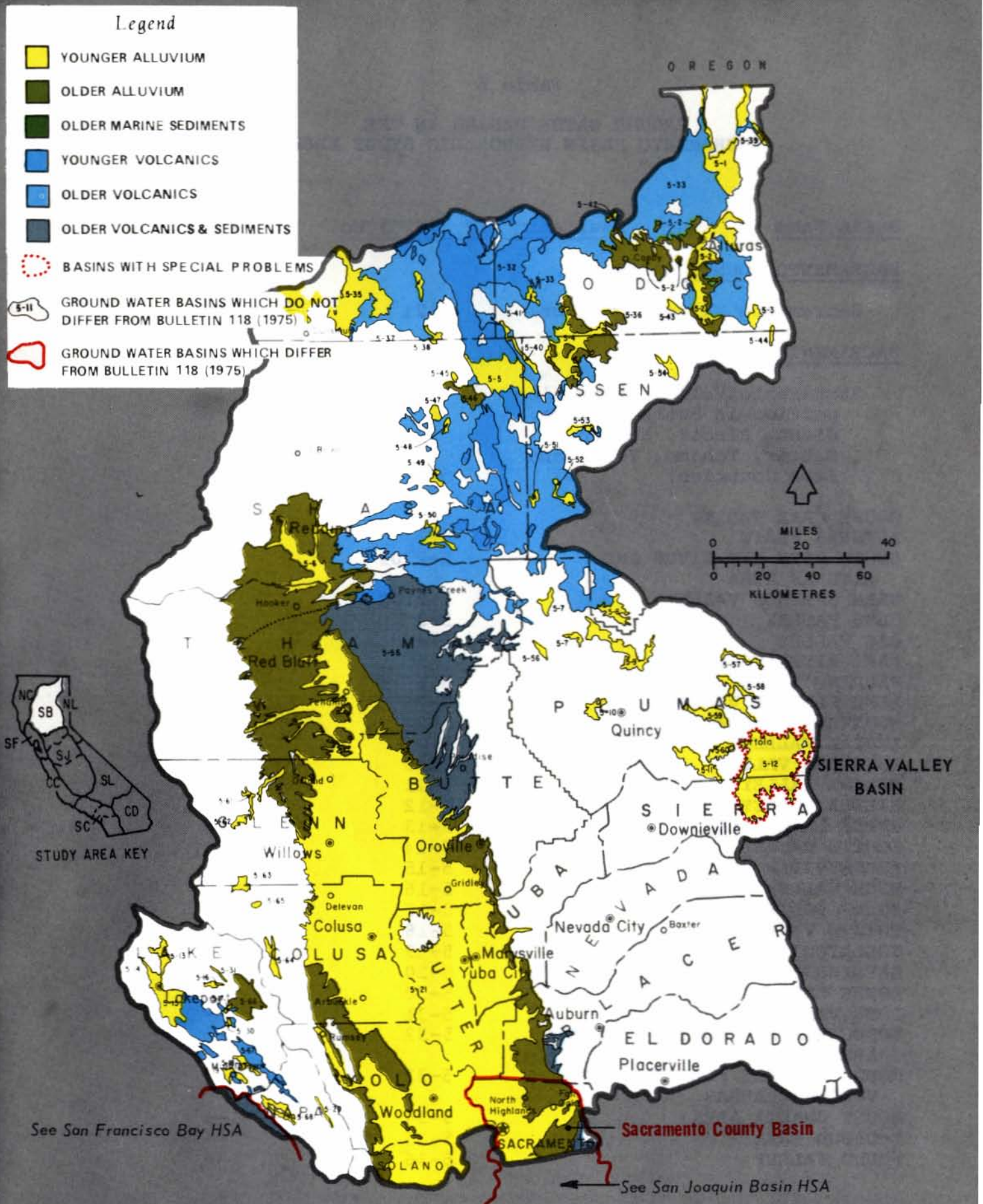

Figure 9

GROUND WATER BASINS - SACRAMENTO BASIN HYDROLOGIC STUDY AREA

Table 5

GROUND WATER BASINS IN THE
SACRAMENTO BASIN HYDROLOGIC STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
SACRAMENTO COUNTY BASIN		yes
Sacramento Valley (portion)	5-21	(d)
SACRAMENTO VALLEY		
Sacramento Valley (remaining portion in Butte, Colusa, Glenn, Placer, Solano, Sutter, Tehama, Yolo, and Yuba Counties)	5-21	--
GOOSE LAKE VALLEY	5-1	--
ALTURAS BASIN	5-2	--
SOUTH FORK PIT RIVER AND ALTURAS AREA	5-2.01	--
WARM SPRINGS VALLEY	5-2.02	--
JESS VALLEY	5-3	--
BIG VALLEY	5-4	--
FALL RIVER VALLEY	5-5	--
REDDING BASIN	5-6	--
LAKE ALMINOR VALLEY	5-7	--
MOUNTAIN MEADOWS VALLEY	5-8	--
INDIAN VALLEY	5-9	--
AMERICAN VALLEY	5-10	--
MOHAWK VALLEY	5-11	--
SIERRA VALLEY	5-12	--
UPPER LAKE VALLEY	5-13	--
SCOTTS VALLEY	5-14	(c)
KELSEYVILLE VALLEY	5-15	--
HIGH VALLEY	5-16	--
BURNS VALLEY	5-17	--
COYOTE VALLEY	5-18	--
COLLAYOMI VALLEY	5-19	--
BERRYESSA VALLEY	5-20	--
LOWER LAKE VALLEY	5-30	--
LONG VALLEY	5-31	--
MODOC PLATEAU RECENT VOLCANIC AREAS	5-32	--
MODOC PLATEAU PLEISTOCENE VOLCANIC AREAS	5-33	--
MOUNT SHASTA AREA	5-34	--
McCLOUD AREA	5-35	--
ROUND VALLEY	5-36	--

Table 5 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
TOAD WELL AREA	5-37	--
PONDOSA TOWN AREA	5-38	--
FANDANGO VALLEY	5-39	--
HOT SPRINGS VALLEY	5-40	--
EGG LAKE VALLEY	5-41	--
BUCHER SWAMP VALLEY	5-42	--
ROCKY PRAIRIE VALLEY	5-43	--
LONG VALLEY	5-44	--
CAYTON VALLEY	5-45	--
LAKE BRITTON AREA	5-46	--
GOOSE VALLEY	5-47	--
BURNEY CREEK VALLEY	5-48	--
DRY BURNEY CREEK VALLEY	5-49	--
NORTH FORK BATTLE CREEK VALLEY	5-50	--
BUTTE CREEK VALLEY	5-51	--
GRAY VALLEY	5-52	--
DIXIE VALLEY	5-53	--
ASH VALLEY	5-54	--
SACRAMENTO VALLEY EASTSIDE TUSCAN FORMATION HIGHLANDS	5-55	--
YELLOW CREEK VALLEY	5-56	--
LAST CHANCE CREEK VALLEY	5-57	--
CLOVER VALLEY	5-58	--
GRIZZLY VALLEY	5-59	--
HUMBUG VALLEY	5-60	--
CHROME TOWN AREA	5-61	--
ELK CREEK AREA	5-62	--
STONYFORD TOWN AREA	5-63	--
BEAR VALLEY	5-64	--
LITTLE INDIAN VALLEY	5-65	--
CLEAR LAKE CACHE FORMATION HIGHLANDS	5-66	--
CLEAR LAKE PLEISTOCENE VOLCANICS	5-67	--
POPE VALLEY	5-68	--

(c) SWRCB Report of Referee, 10/26/76, land subsidence has occurred but withdrawal does not exceed supply.

(d) Bulletin 118-3, "Evaluation of Ground Water Resources: Sacramento County", 1975.

Sacramento County Basin. The Sacramento County Basin consists of the Sacramento County west of the edge of the alluvium. This basin is identified in response to the request from Sacramento County.

Basins Subject to Critical Conditions of Overdraft

No basins in the Sacramento Basin Hydrologic Study Area are identified as subject to critical conditions of overdraft.

Basins With Special Problems

Only one basin with special problems has been identified in the Sacramento Basin Hydrologic Study Area.

Sierra Valley Basin. In the Sierra Valley, which is primarily a cattle area, Sierra Valley ground water is threatened by the drilling of large agricultural wells and an impending population growth. Pressures for housing subdivisions because of population growth in Nevada have increased. Some existing wells have lost considerable artesian head. In fact, artesian head in some areas has dropped below ground surface, thereby severely complicating the problem of providing winter water for cattle. The basin is situated in Sierra and Plumas Counties.

San Joaquin Basin Hydrologic Study Area

Figure 10 presents the 39 ground water basins in the San Joaquin Basin Hydrologic Study Area. Table 6 shows those basins and identifies eight basins now indicated to be in overdraft.

Ground Water Basin Boundaries

The Sacramento County Basin extends into this hydrologic study area but is discussed under the Sacramento Basin Hydrologic Study Area.

Local views included both leaving the San Joaquin Valley as one basin and identifying each existing water agency boundary as a ground water basin boundary.

The San Joaquin Valley is divided into 15 separate basins, largely based on political considerations. Division into these basins is essential for ground water management, since management of the valley as a whole is impractical. Division along all existing water agency boundaries would result in basins with technical problems in the conduct of management activities.

Eastern San Joaquin County Basin. The boundaries are the county line on the north, the San Joaquin River on the west, the county line and the Stanislaus River on the south, and the edge of the alluvium on the east. The basin includes a portion of Stanislaus County in the southeast portion. The specific boundaries were endorsed by local water agency personnel.

Modesto Basin. The Modesto Basin lies between the Stanislaus and Tuolumne Rivers, from the San Joaquin River on the west to the Sierra Nevada foothills on the east. The basin comprises land in the Modesto Irrigation District, the southern two-thirds of the Oakdale Irrigation District, and lands to the east in the unincorporated area called Cooperstown.

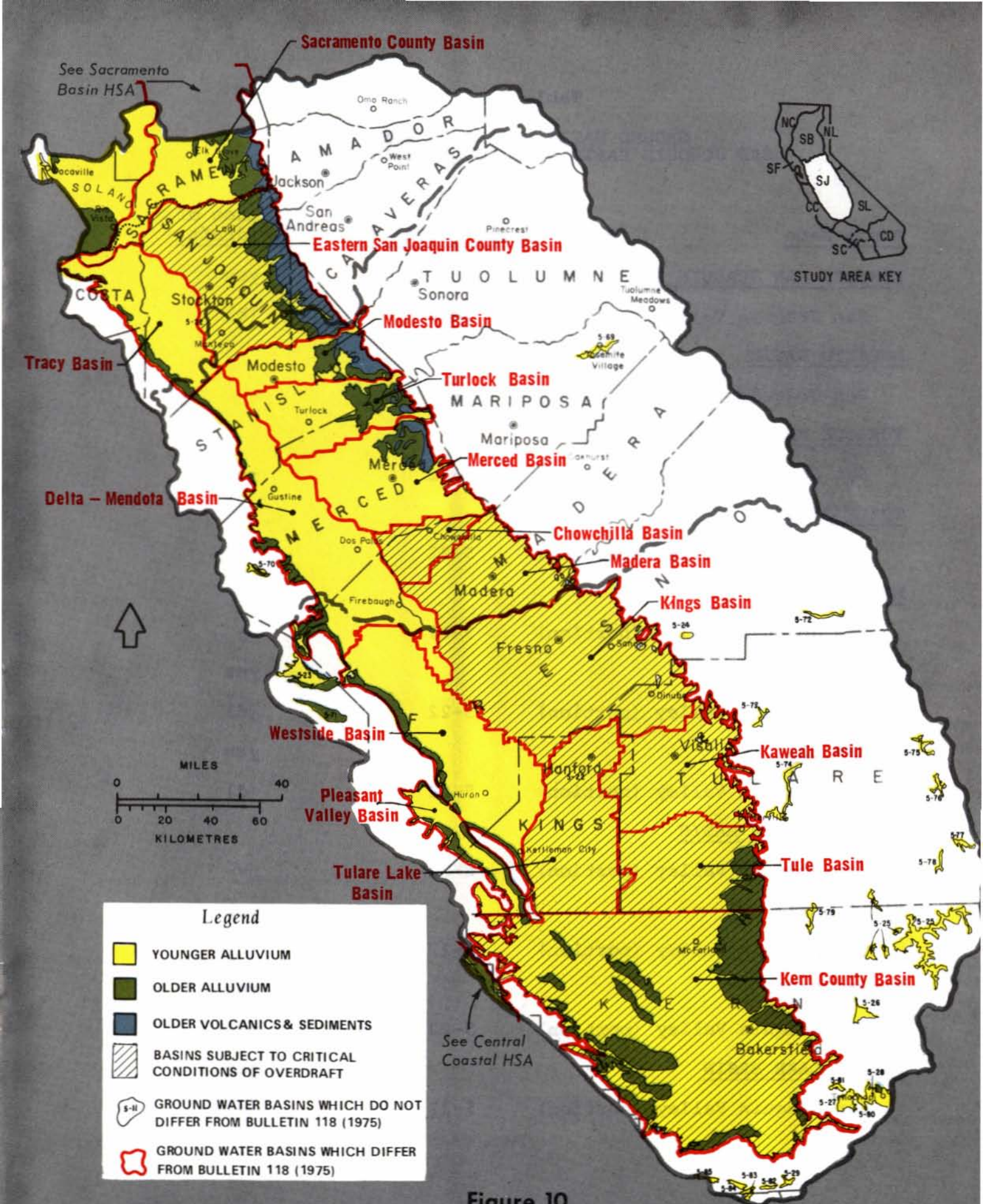

Figure 10

GROUND WATER BASINS - SAN JOAQUIN BASIN HYDROLOGIC STUDY AREA

Table 6

GROUND WATER BASINS IN THE
SAN JOAQUIN BASIN HYDROLOGIC STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
EASTERN SAN JOAQUIN COUNTY BASIN		yes
San Joaquin Valley (portion)	5-22	(b)
MODESTO BASIN		
San Joaquin Valley (portion)	5-22	--
TURLOCK BASIN		
San Joaquin Valley (portion)	5-22	--
TRACY BASIN		
San Joaquin Valley (portion)	5-22	--
MERCED BASIN		
San Joaquin Valley (portion)	5-22	--
CHOWCHILLA BASIN		yes
San Joaquin Valley (portion)	5-22	(d)
MADERA BASIN		yes
San Joaquin Valley (portion)	5-22	(d)
DELTA-MENDOTA BASIN		
San Joaquin Valley (portion)	5-22	--
KINGS BASIN		yes
San Joaquin Valley (portion)	5-22	(d)
KAWEAH BASIN		yes
San Joaquin Valley (portion)	5-22	(d)
TULARE LAKE BASIN		yes
San Joaquin Valley (portion)	5-22	(d)

Table 6 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
TULE BASIN		yes
San Joaquin Valley (portion)	5-22	(d)
PLEASANT VALLEY BASIN		
San Joaquin Valley (portion)	5-22	--
WESTSIDE BASIN		
San Joaquin Valley (portion)	5-22	--
KERN COUNTY BASIN		yes
San Joaquin Valley (portion)	5-22	(e)
PANOCHE VALLEY	5-23	--
SQUAW VALLEY	5-24	--
KERN RIVER VALLEY	5-25	--
WALKER BASIN CREEK VALLEY	5-26	--
CUMMINGS VALLEY	5-27	--
TEHACHAPI VALLEY WEST	5-28	--
CASTAC LAKE VALLEY	5-29	--
YOSEMITE VALLEY	5-69	--
LOS BANOS CREEK VALLEY	5-70	--
VALLECITOS CREEK VALLEY	5-71	--
CEDAR GROVE AREA	5-72	--
THREE RIVERS AREA	5-73	--
SPRINGVILLE AREA	5-74	--
TEMPLETON MOUNTAIN AREA	5-75	--
MANACHE MEADOWS AREA	5-76	--
SACATOR CANYON VALLEY	5-77	--
ROCKHOUSE MEADOW VALLEY	5-78	--
INNS VALLEY	5-79	--
BRITE VALLEY	5-80	--
BEAR VALLEY	5-81	--
CUDDY CANYON VALLEY	5-82	--
CUDDY RANCH AREA	5-83	--
CUDDY VALLEY	5-84	--
MILL POTRERA AREA	5-85	--

(b) Water Code Section 12924 Public Hearing Record: Statement of Richard W. Dickenson, San Joaquin County Flood Control and Water Conservation District.

(d) DWR District Report on Mid-Valley Canal Areal Study, publication pending.

(e) Original data presented in speech "Dust Bin of History" by Ronald B. Robie, Director, Department of Water Resources, to State Board of Food and Agriculture on February 1, 1979.

Turlock Basin. The Turlock Basin lies between the Tuolumne and Merced Rivers and is bounded on the west by the San Joaquin River and on the east by the Sierra Nevada foothills. The basin includes lands in the Turlock Irrigation District, the Ballico-Cortez Water District, and the unincorporated Montpelier area.

Tracy Basin. The basin includes all San Joaquin Valley older and younger alluvium in Contra Costa and Santa Clara Counties and that portion of San Joaquin County west of the San Joaquin River.

Merced Basin. The basin includes lands south of the Merced River between the San Joaquin River on the west and the Sierra Nevada foothills on the east. The proposed basin boundary on the south stretches westerly along the Madera-Merced County line and the southern boundary of the Le Grand-Athlone Water District, then along the northern boundaries of the La Branza Water District, Sections 14 and 15 in Township 9 South, Range 14 East, and the El Nido Irrigation District. The southern boundary of the basin then follows the western boundary of El Nido Irrigation District south to the northern boundary of the Sierra Water District, which is followed westerly to the San Joaquin River.

Chowchilla Basin. The Chowchilla Basin includes lands in Madera and Merced Counties. The basin is bounded on the west by the San Joaquin River and the eastern boundary of the Columbia Canal Company Service Area and on the north by the southern boundary of the Merced Basin. The southern boundary from west to its connection with the northern boundary runs along the southern boundary of Township 11 South, Range 14 East, and the southern boundary of Progressive Water District, northerly along the eastern boundaries of Progressive Water District and Sections 9 and 16 of Township 11 South, Range 15 East, and northeasterly along the southern and eastern boundaries of Chowchilla Water District, then northeasterly following Berenda Slough and Ash Slough to the Chowchilla River.

Madera Basin. The Madera Basin consists of lands overlying the alluvium in Madera County. The basin is bounded on the south by the San Joaquin River; on the west by the eastern boundary of the Columbia Canal Company Service Area; on the north by the south boundary of the Chowchilla Basin; and on the east by the Sierra Nevada foothills.

Delta-Mendota Basin. The Delta-Mendota Basin lies for the most part west of the San Joaquin River, and covers those lands receiving surface water from the Delta-Mendota Canal. The northern boundary is the northern boundary of Stanislaus County, the eastern boundary is the San Joaquin River south to the northern boundary of the Columbia Canal Company Service Area. The Delta-Mendota Basin takes in all of the Columbia Canal

Company Service Area and the New Columbia Ranch, which are entities receiving Water and Power Resources Service exchange contract water supplies, and which lie generally between the San Joaquin River, the Columbia Canal, and the Chowchilla Bypass. South of the San Joaquin River, the eastern boundary continues south along the eastern boundaries of Farmers' Water District, Section 35 of Township 13 South, Range 15 East, Sections 2 and 13 of Township 14 South, Range 15 East, and the Mendota Wildlife Refuge. The eastern boundary continues south along the western boundaries of Traction Water District and James Irrigation District, and then northerly along the eastern and northern boundaries of the Westlands Water District. The remainder of the basin's western boundary lies at the western edge of San Joaquin Valley alluvium.

Kings Basin. The large local districts in the basin include the Alta, Consolidated, and Fresno Irrigation Districts and the Raisin City Water District.

The Kings Basin is bounded on the north by the San Joaquin River to the boundary of the Farmers Water District, and on the west by the eastern boundaries of the Delta-Mendota Basin and the Westlands Water District. The southern boundary runs easterly along the northern boundary of the Empire Westside Irrigation District, the south fork of the Kings River, the southern boundary of Laguna Irrigation District, the northern boundary of the Kings County Water District, the southern boundaries of Consolidated and Alta Irrigation Districts, and the western boundary of Stone Corral Irrigation District. The eastern boundary is the Sierra Nevada foothills.

Kaweah Basin. The Kaweah Basin lies between the Kings Basin on the north, the Tule Basin on the south, the Sierra Nevada foothills on the east, and the Kings River Conservation District on the west. The basin generally comprises lands in the Kaweah Delta Water Conservation District.

Tulare Lake Basin. This basin comprises lands mainly in the old Tulare Lake in Kings County. Tulare Lake Basin is bounded on the south by the Kings-Kern County line, on the west by the California Aqueduct and the eastern boundary of Westlands Water District, on the north by the southern boundary of Kings Basin, and on the east by the westerly boundaries of the Kaweah and Tule Basins. Although the ground water underlying the southwestern portion of the basin is poor in quality and most wells drilled there have been abandoned because of poor yield and poor quality, the area has been retained within the basin boundaries.

Tule Basin. The Tule Basin is generally bounded on the west by the Tulare County line, excluding those portions of Tulare Lake Basin Water Storage District and Sections 29 and 30 of Township 23 South, Range 23 East, that are west of Homeland Canal. The northern boundary of the basin follows the northern boundaries of Lower Tule Irrigation District and Porterville Irrigation District and the southern boundary of Lindmore Irrigation District, the eastern boundary is at the edge of the alluvium, and the southern boundary is the Tulare-Kern County Line.

Pleasant Valley Basin. This basin includes the older and younger alluvium of the San Joaquin Valley north of the Kern County line and west of the Tulare Lake Basin and the Westside Basin.

Westside Basin. The Westside Basin consists mainly of lands in the Westlands Water District. Heavy pumping occurred prior to construction of the San Luis Unit of the Central Valley Project, causing ground subsidence as much as 8.5 metres (28 feet) in one area and lower ground water levels.

Kern County Basin. The Kern County Basin consists of that portion of the San Joaquin Valley in Kern County and includes the contiguous older and younger alluvium.

Basins Subject to Critical Conditions of Overdraft

Eight basins have been identified as subject to critical conditions of overdraft in the San Joaquin Basin Hydrologic Study Area.

Eastern San Joaquin County Basin. This basin for many years has experienced overdraft, the adverse effects of which include declining water levels that have induced the movement of poor quality water from the Delta sediments eastward near the City of Stockton. Migration of these saline waters has severely impacted the utility of ground water in the vicinity of Stockton. Wells have been abandoned and replacement water supplies have been obtained by drilling additional wells generally to the east. For partial mitigation of these adverse impacts, supplemental water from the Calaveras River through the Stockton-East Water District Aqueduct is being substituted for ground water.

To stop the easterly migration of poor quality water would require maintaining higher water levels in the basin and other measures, which, in turn, would probably reduce ground water inflow from the south. Under those higher water level conditions, the estimated supplemental water requirement would be materially greater than at the present. The exact amount of overdraft and supplemental water requirement is presently under study.

The identification of the Eastern San Joaquin County Basin as subject to critical conditions of overdraft is based on the existing overdraft and the adverse effects described above.

Chowchilla Basin. Overdraft in the basin was estimated at 62 000 cubic dekametres (50,000 acre-feet) annually in 1975, based upon the DWR Mid-Valley Canal Areal Study. Chowchilla Water District, which lies in the eastern portion of the basin, presently has a balanced water budget due to CVP deliveries from the Madera Canal and an estimated 29 600 cubic-dekametre (24,000 acre-foot) annual new water yield from the recently completed Buchanan Dam on the Chowchilla River.

However, ground water meets nearly all applied water demands in the areas to the southwest and to the north of Chowchilla Water District, and maximum ground water level declines amounted to over 2 metres (6 feet) per year during the period 1970-75. These areas are experiencing a rapid growth in irrigated agriculture. Ground water level lowering in these areas of heavy pumping is expected to induce greater subsurface flows from the Chowchilla Water District area and cause water levels there to drop.

A water quality problem has developed over the years in the southwest portion of the basin due to the reclamation of lands for agricultural expansion. The heavy pumping and application of water for leaching of salts from the soils has apparently carried those salts to the ground water.

Adverse effects from the overdraft include increasing ground water pumping lifts, costs, and energy usage, and the water quality problems. The Chowchilla Basin is identified as subject to critical conditions of overdraft, as present water management practices would probably result in adverse environmental, social or economic impacts, particularly in the western portion of the basin.

Madera Basin. Overdraft in the basin was estimated at 123 000 cubic dekametres (100,000 acre-feet) annually in 1975, based upon the DWR Mid-Valley Canal Areal Study. Madera Irrigation District, which lies in the central portion of the basin, presently has a balanced water budget due to CVP deliveries from the Madera Canal and an estimated 29 600 cubic-dekametre (24,000 acre-foot) annual new water yield from the recently completed Hidden Dam on the Fresno River. However, ground water meets nearly all applied water demands in the area west of Madera Irrigation District, where agricultural development is growing rapidly and maximum ground water level declines amounted to over 2 metres (6 feet) per year for the period 1970-75. Heavy pumping is also occurring to the east of Madera Irrigation District, where cropped acreage has increased by 10 100 hectares (25,000 acres) during the period 1958-74 and where only minor amounts of surface water are available. The

heavy pumping outside of the Madera Irrigation District is expected to induce greater subsurface outflows from the District area and cause a water level decline. Land subsidence due to ground water withdrawals was as great as 0.6 metres (2 feet) in the extreme western portion of the basin during the 13-year period from 1957-70.

Adverse effects from the overdraft include increasing ground water pumping lifts, costs, and energy usage, and land subsidence. Water quality degradation is also occurring from land reclamation. The identification of the Madera Basin as subject to critical conditions of overdraft is based upon the adverse effects noted above.

Kings Basin. Overdraft in the basin was estimated at 289 000 cubic dekametres (234,000 acre-feet) annually in 1975 in the Mid-Valley Canal Areal Study. The basin includes three major irrigation districts (Fresno, Consolidated, and Alta) in the upper Kings River service area, and several smaller water agencies in the lower Kings River service area. The extensive development of irrigated agriculture in the area west of the Fresno and the Consolidated Irrigation Districts is based on ground water. Maximum ground water level declines now exceed 2 metres (6 feet) per year, and one of the most extensive cones of depression in the State occurs here. Subsurface outflows to this cone from Fresno and Consolidated Irrigation Districts areas have resulted in a ground water level decline in the western portion of the districts. About 25 percent of the western portion of the basin is affected by land subsidence due to ground water withdrawals, with a maximum subsidence of over 0.6 metres (2 feet) during the 13-year period 1957-70.

Adverse impacts from the overdraft include land subsidence and increased cost and energy usage associated with pumping. The identification of the Kings River Basin as subject to critical condition of overdraft is based upon present overdraft and the adverse effects occuring in the western portion of the basin.

Kaweah Basin. Overdraft in the basin was estimated at 185 000 cubic dekametres (150,000 acre-feet) in 1975 in the Mid-Valley Canal Area Study. The western half of the basin relies predominantly on ground water, and water level decline is the result of development of irrigated agriculture on lands with an inadequate surface water supply.

Maximum ground water level declines exceed 2 metres (6 feet) per year in an area southeast of Hanford. About 25 percent of the western portion of the basin is subject to land subsidence due to ground water withdrawals, with a maximum subsidence of 1.5 metres (5 feet) during the 13-year period 1957-70.

Adverse effects from the overdraft include land subsidence and increased costs and energy usage associated with pumping. The

identification of the Kaweah Basin as subject to critical conditions of overdraft is based upon present overdraft and these adverse effects.

Tulare Lake Basin. In the Mid-Valley Canal Areal Study, overdraft for 1975 in the portion of the basin overlying usable ground water was estimated at 52 000 cubic dekametres (42,000 acre-feet) annually. Ground water under the Tulare Lake bed area is unusable because of a high concentration of dissolved solids. A maximum annual ground water level decline of over 1.3 metres (4 feet) per year is occurring just north of Hanford. Deep subsidence from ground water withdrawals occurs over the entire basin with a maximum of 1.5 metres (5 feet) just east of Hanford for the period 1957-70. Compaction of the aquifer system, as indicated by deep subsidence, accounts for about two-thirds of the ground water.

Adverse effects from the overdraft include land subsidence and increased cost and energy usage associated with pumping. The identification of the Tulare Basin as subject to critical conditions of overdraft is based upon present overdraft and continuation of these adverse effects in the western portion of the basin.

Tule Basin. Overdraft for 1975 in the basin was estimated at 201 000 cubic dekametres (163,000 acre-feet) annually in the Mid-Valley Canal Areal Study. As in the Kaweah Basin, the excessive pumping is occurring predominantly in the western half of the basin as the result of development of irrigated agriculture on lands having inadequate surface water supplies. Heavy pumping in a small area is also occurring in the southeastern portion of the basin. Deep subsidence from ground water withdrawals is occurring over about 85 percent of the basin with a maximum subsidence of over 1.5 metres (5 feet) near the city of Pixley for the 13-year period 1957-70. Compaction of the aquifer system, as indicated by deep subsidence, accounts for about 80 percent of the ground water storage depletion, the remaining 20 pecent being from dewatering of unconfined aquifers.

Adverse effects from the overdraft include land subsidence and the costs and energy use associated with pumping. The identification of the Tule Basin as subject to critical conditions of overdraft is based on overdraft and the adverse effects noted above.

Kern County Basin. The Kern County Water Agency, which covers the Kern County Basin, presently receives about half of its maximum annual entitlement from the State Water Project. If no new lands were to go into production, and the full entitlement from the State Water Project were delivered today, there would be no overdraft in Kern County as a whole. But with no restrictions on new ground water development, the overdraft is expected to continue to grow.

Overdraft in the Kern County portion of the San Joaquin Valley is currently estimated at about 740 000 cubic dekametres (600,000 acre-feet) per year. The most significant adverse effect from overdraft is the increasing cost of energy associated with pumping. Compaction recorders located in Section 1, Township 25 South, Range 25 West, MDB&M, and Section 1, Township 11 North, Range 21 West, MDB&M, show that deep subsidence is continuing in Kern County. The increased imports of surface water in the Arvin-Maricopa area have reduced the rate of deep subsidence. In the northeastern portion of the ground water basin, ground water pumping to irrigate orchard acreage has caused increased deep subsidence.

Basins With Special Problems

Excessive development of ground water in rock fractures of the Sierra Nevada at Oakhurst is an example of the statewide problem discussed earlier.

North Lahontan Hydrologic Study Area

Figure 11 and Table 7 present the 28 ground water basins identified in the North Lahontan Hydrologic Study Area. The Bulletin 118 (1975) inventory covers ten of these basins. None of the basins in the North Lahontan Hydrologic Study Area are in overdraft.

Ground Water Basin Boundaries

All basins in the North Lahontan Hydrologic Study Area are identified as each appears in Bulletin 118 (1975).

Basins Subject to Critical Conditions of Overdraft

No basins in the North Lahontan Hydrologic Study Area have been identified as subject to critical conditions of overdraft.

Basins With Special Problems

Two basins have been identified in the North Lahontan Hydrologic Study Area as basins with special problems. In both cases the problem surfaced at the workshops held in March and April of 1979.

Surprise Valley Basin. In the Surprise Valley Basin in northeastern California, ground water levels have been declining due not only to a below normal water supply, but also possibly to an increased use of high-capacity irrigation wells. The relative importance of each is presently unknown. During the period of record beginning in 1962, spring water levels have declined a net 2.25 metres (7.4 feet).

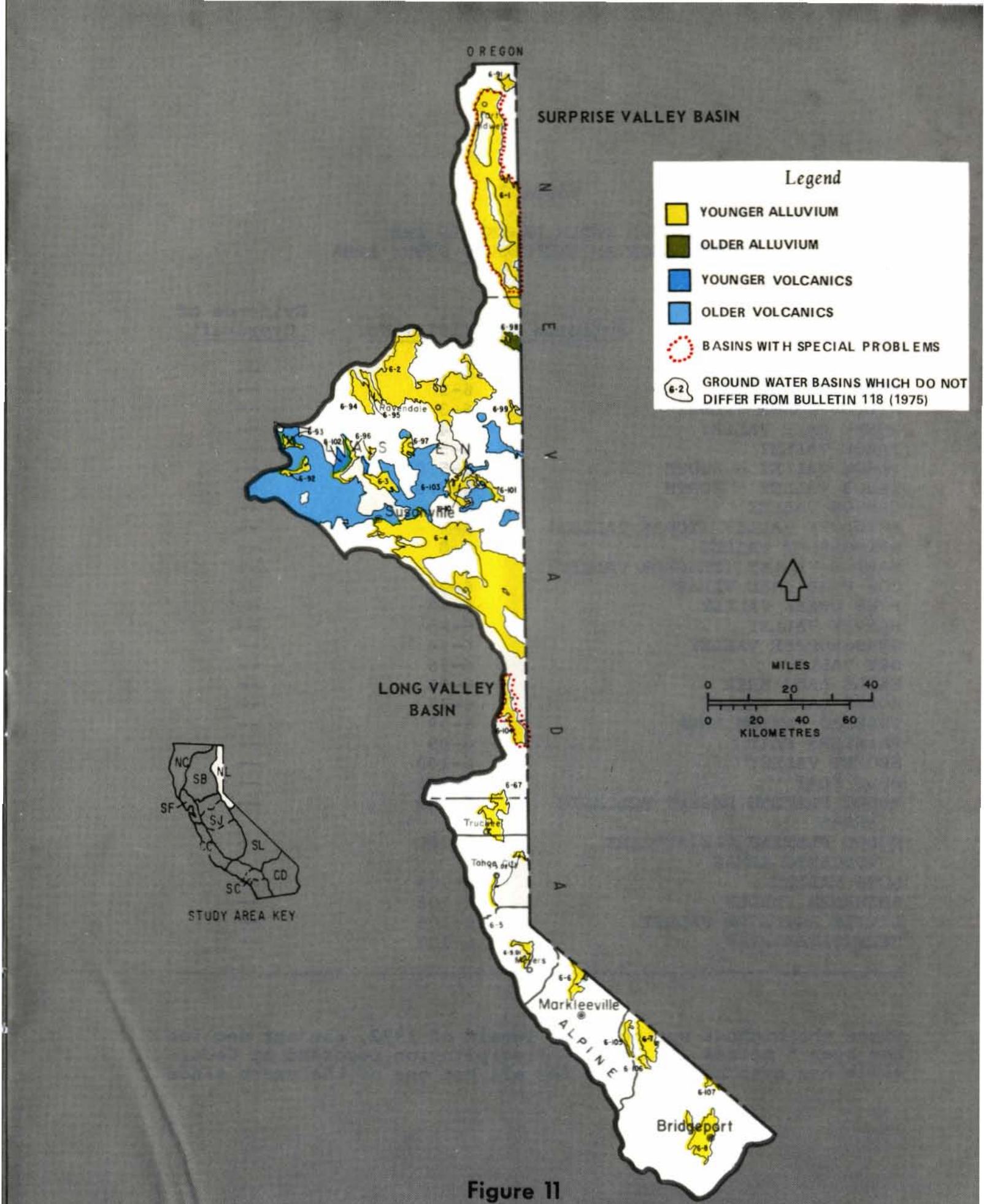

Figure 11

GROUND WATER BASINS - NORTH LAHONTAN HYDROLOGIC STUDY AREA

Table 7

GROUND WATER BASINS IN THE
NORTH LAHONTAN HYDROLOGIC STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
SURPRISE VALLEY	6-1	--
MADELINE PLAINS	6-2	--
WILLOW CREEK VALLEY	6-3	--
HONEY LAKE VALLEY	6-4	--
TAHOE VALLEY	6-5	--
TAHOE VALLEY - SOUTH	6-5.01	--
TAHOE VALLEY - NORTH	6-5.02	--
CARSON VALLEY	6-6	--
ANTELOPE VALLEY (TOPAZ VALLEY)	6-7	--
BRIDGEPORT VALLEY	6-8	--
MARTIS VALLEY (TRUCKEE VALLEY)	6-67	--
COW HEAD LAKE VALLEY	6-91	--
PINE CREEK VALLEY	6-92	--
HARVEY VALLEY	6-93	--
GRASSHOPPER VALLEY	6-94	--
DRY VALLEY	6-95	--
EAGLE LAKE AREA	6-96	--
HORSE LAKE VALLEY	6-97	--
TULEDAD CANYON AREA	6-98	--
PAINTERS FLAT	6-99	--
SECRET VALLEY	6-100	--
BULL FLAT	6-101	--
MODOC PLATEAU RECENT VOLCANIC AREAS	6-102	--
MODOC PLATEAU PLEISTOCENE VOLCANIC AREAS	6-103	--
LONG VALLEY	6-104	--
SLINKARD VALLEY	6-105	--
LITTLE ANTELOPE VALLEY	6-106	--
SWEETWATER FLAT	6-107	--

Since the highest spring water levels of 1972, the net decline has been 5 metres (17 feet). Precipitation recorded at Cedarville has been below normal for all but one of the years since

1972, which partially explains the decline. Because of insufficent data on hydrology and ground water pumpage, overdraft status for the Surprise Valley is not yet supportable.

Long Valley Basin. The Long Valley Basin lies in Sierra and Lassen Counties adjacent to the Nevada Stateline, and receives runoff from Nevada. Local agencies reported that Metropolitan Reno is examining the Nevada side of Long Valley for a possible ground water export project. Several wells have already been constructed along the border for nearby Nevada subdivision water supply.

Long Valley is also feeling subdivision pressures, principally as a residential community for metropolitan Reno employees. These factors compound to raise serious questions regarding the adequacy of Long Valley ground water resources to support additional stress.

South Lahontan Hydrologic Study Area

Figure 12 and Table 8 present the 81 ground water basins identified in the South Lahontan Hydrologic Study Area. The inventory in Bulletin 118 (1975) covers 55 of these basins. Some evidence of overdraft is available for seven of the basins in the South Lahontan Hydrologic Study Area.

Ground Water Basin Boundaries

All basins identified in the South Lahontan Hydrologic Study Area are as presented in Bulletin 118 (1975).

Basins Subject to Critical Conditions of Overdraft

No basins in the South Lahontan Hydrologic Study Area have been identified as subject to critical conditions of overdraft.

Basins With Special Problems

Only one basin in the South Lahontan Hydrologic Study Area has been identified as having a special problem.

Owens Valley Basin. At the Bishop workshop and at the public hearings a great deal of concern was expressed about ground water use and development in the Owens Valley Basin. Earlier in 1979, the Los Angeles Department of Water and Power filed with the court the final EIR covering the proposed ground water pumping program in the Valley. Local residents and others report the City's pumping program has already had an adverse impact on the natural vegetation, spring flow, and environment.

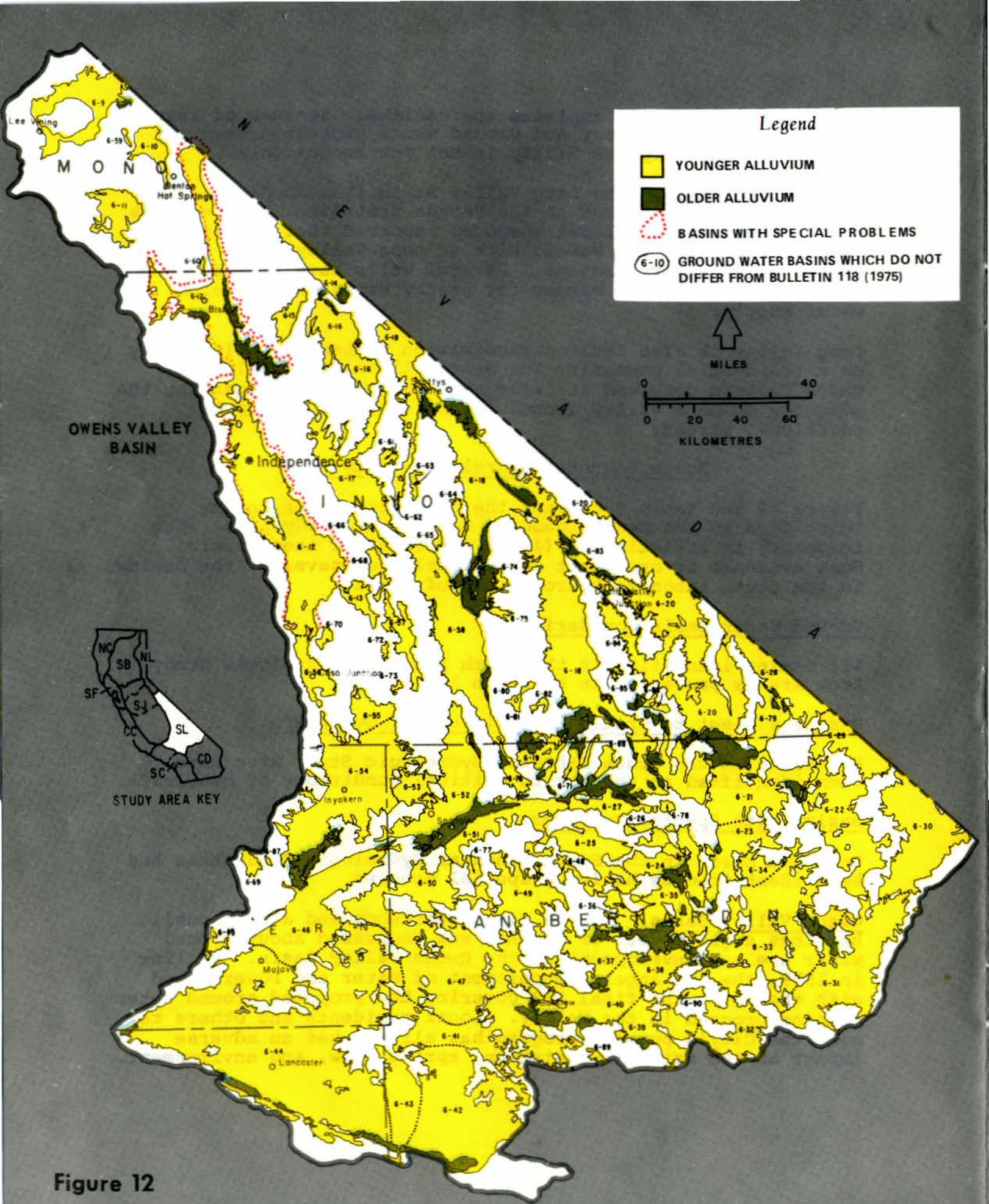

Figure 12

GROUND WATER BASINS - SOUTH LAHONTAN HYDROLOGIC STUDY AREA

Table 8

GROUND WATER BASINS IN THE
SOUTH LAHONTAN HYDROLOGIC STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
MONO VALLEY	1-9	--
ADOBE LAKE VALLEY	6-10	--
LONG VALLEY	6-11	--
OWENS VALLEY	6-12	--
BLACK SPRINGS VALLEY	6-13	--
FISH LAKE VALLEY	6-14	--
DEEP SPRINGS VALLEY	6-15	--
EUREKA VALLEY	6-16	--
SALINE VALLEY	6-17	--
DEATH VALLEY	6-18	--
WINGATE VALLEY	6-19	--
MIDDLE AMARGOSA VALLEY	6-20	--
LOWER KINGSTON VALLEY	6-21	--
UPPER KINGSTON VALLEY	6-22	--
RIGGS VALLEY	6-23	--
RED PASS VALLEY	6-24	--
BICYCLE VALLEY	6-25	--
AVAWATZ VALLEY	6-26	--
LEACH VALLEY	6-27	--
PAHRUMP VALLEY	6-28	(c)
MESQUITE VALLEY	6-29	--
IVANPAH VALLEY	6-30	--
KELSO VALLEY	6-31	--
BROADWELL VALLEY	6-32	--
SODA LAKE VALLEY	6-33	--
SILVER LAKE VALLEY	6-34	--
CRONISE VALLEY	6-35	--
LANGFORD VALLEY	6-36	--
COYOTE LAKE VALLEY	6-37	--
CAVES CANYON VALLEY	6-38	--
TROY VALLEY	6-39	--
LOWER MOJAVE RIVER VALLEY	6-40	(a)
MIDDLE MOJAVE RIVER VALLEY	6-41	(a)
UPPER MOJAVE RIVER VALLEY	6-42	(a)
EL MIRAGE VALLEY	6-43	--
ANTELOPE VALLEY	6-44	(a)
TEHACHAPI VALLEY EAST	6-45	--
FREMONT VALLEY	6-46	--
HARPER VALLEY	6-47	(c)
GOLDSTONE VALLEY	6-48	--
SUPERIOR VALLEY	6-49	--
CUDDEBACK VALLEY	6-50	--
PILOT KNOB VALLEY	6-51	--
SEARLES VALLEY	6-52	--
SALT WELLS VALLEY	6-53	--

Table 8 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
INDIAN WELLS VALLEY	6-54	(a)
COSO VALLEY	6-55	--
ROSE VALLEY	6-56	--
DARWIN VALLEY	6-57	--
PANAMINT VALLEY	6-58	--
GRANITE MOUNTAIN AREA	6-59	--
FISH SLOUGH VALLEY	6-60	--
CAMEO AREA	6-61	--
RACE TRACK VALLEY	6-62	--
HIDDEN VALLEY	6-63	--
MARBLE CANYON AREA	6-64	--
COTTONWOOD SPRING AREA	6-65	--
LEE FLAT	6-66	--
SANTA ROSA FLAT	6-68	--
KELSO LANDER VALLEY	6-69	--
CACTUS FLAT	6-70	--
LOST LAKE VALLEY	6-71	--
COLES FLAT	6-72	--
WILD HORSE MESA AREA	6-73	--
HARRISBURG FLATS	6-74	--
WILDROSE CANYON	6-75	--
BROWN MOUNTAIN VALLEY	6-76	--
GRASS VALLEY	6-77	--
DENNING SPRING VALLEY	6-78	--
CALIFORNIA VALLEY	6-79	--
MIDDLE PARK CANYON	6-80	--
BUTTE VALLEY	6-81	--
SPRING CANYON VALLEY	6-82	--
FURNACE CREEK AREA	6-83	--
GREENWATER VALLEY	6-84	--
GOLD VALLEY	6-85	--
RHODES HILL AREA	6-86	--
BUTTERHEAD CANYON VALLEY	6-87	--
OWL LAKE VALLEY	6-88	--
KANE WASH AREA	6-89	--
CADY FAULT AREA	6-90	--

(a) See Bulletin 118 (1975).

(c) U. S. Geological Survey Reports.

Colorado Desert Hydrologic Study Area

Figure 13 and Table 9 show 61 ground water basins in the Colorado Desert Hydrologic Study Area. The inventory in Bulletin 118 (1975) covers 46 basins. Six basins are identified as having an overdraft.

Ground Water Basin Boundaries

All basin boundaries in the Colorado Desert Hydrologic Study Area are as presented in Bulletin 118 (1975).

Basins Subject to Critical Conditions of Overdraft

No basins have been identified as subject to critical conditions of overdraft in the Colorado Desert Hydrologic Study Area.

Basins With Special Problems

There are no basins with special problems identified within the Colorado Desert Hydrologic Study Area.

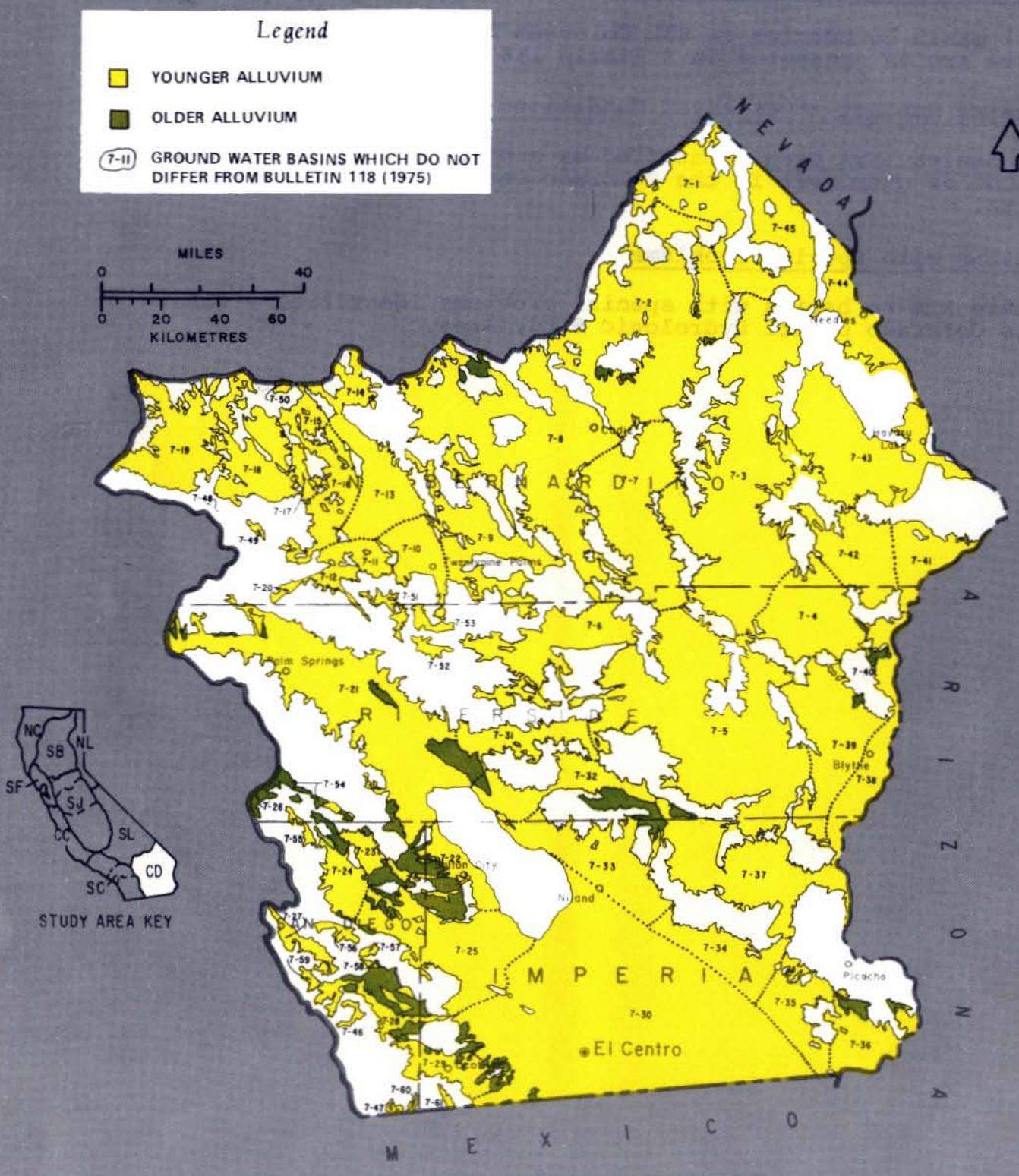

Figure 13

GROUND WATER BASINS - COLORADO DESERT HYDROLOGIC STUDY AREA

Table 9

GROUND WATER BASINS IN THE
COLORADO DESERT HYDROLOGIC STUDY AREA

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
LANFAIR VALLEY	7-1	--
FENNER VALLEY	7-2	--
WARD VALLEY	7-3	--
RICE VALLEY	7-4	--
CHUCKWALLA VALLEY	7-5	--
PINTO VALLEY	7-6	--
CADIZ VALLEY	7-7	--
BRISTOL VALLEY	7-8	--
DALE VALLEY	7-9	--
TWENTYNINE PALMS VALLEY	7-10	(c)
COPPER MOUNTAIN VALLEY	7-11	--
WARREN VALLEY	7-12	(c)
DEADMAN VALLEY	7-13	--
LAVIC VALLEY	7-14	--
BESSEMER VALLEY	7-15	--
AMES VALLEY	7-16	--
MEANS VALLEY	7-17	--
JOHNSON VALLEY	7-18	--
LUCERNE VALLEY	7-19	(a)
MORONGO VALLEY	7-20	--
COACHELLA VALLEY	7-21	(a)
WEST SALTON SEA BASIN	7-22	--
CLARK VALLEY	7-23	--
BORREGO VALLEY	7-24	(a)
OCOTILLO VALLEY	7-25	--
TERWILLIGER VALLEY	7-26	--
SAN FELIPE VALLEY	7-27	--
VALLECITO-CARRIZO VALLEY	7-28	--
COYOTE WELLS VALLEY	7-29	--
IMPERIAL VALLEY	7-30	--
OROCOPIA VALLEY	7-31	--
CHOCOLATE VALLEY	7-32	--
EAST SALTON SEA BASIN	7-33	--
AMOS VALLEY	7-34	--
OGILBY VALLEY	7-35	--
YUMA VALLEY	7-36	--
ARROYO SECO VALLEY	7-37	--
PALO VERDE VALLEY	7-38	--
PALO VERDE MESA	7-39	--
QUIEN SABE POINT VALLEY	7-40	--
CALZONA VALLEY	7-41	--
VIDAL VALLEY	7-42	--
CHEMEHUEVI VALLEY	7-43	--
NEEDLES VALLEY	7-44	(c)
PIUTE VALLEY	7-45	--

Table 9 (Continued)

Basin Name	Bulletin 118 (1975) No.	Evidence of Overdraft
CANEBRAKE VALLEY	7-46	--
JACUMBA VALLEY	7-47	--
HELENDALE FAULT VALLEY	7-48	--
PIPES CANYON FAULT VALLEY	7-49	--
IRON RIDGE AREA	7-50	--
LOST HORSE VALLEY	7-51	--
PLEASANT VALLEY	7-52	--
HEXIE MOUNTAIN AREA	7-53	--
BUCK RIDGE FAULT VALLEY	7-54	--
COLLINS VALLEY	7-55	--
YAQUI WELL AREA	7-56	--
PINYON WASH AREA	7-57	--
WHALE PEAK AREA	7-58	--
MASON VALLEY	7-59	--
JACUMBA VALLEY-EAST	7-60	--
DAVIES VALLEY	7-61	--

(a) See Bulletin 118 (1975).

(c) U. S. Geological Survey Reports.

APPENDIX A

DEFINITIONS

Alluvium--a geologic term describing beds of sand, gravel, silt, and clay deposited by flowing water.

Alluvium (younger)--sand, gravel, silt and clay deposits of recent geologic age.

Alluvium (older)--sand, gravel, silt, and clay deposits with an age range of 100's of thousands to more than 1 million years.

Aquifer--a geologic formation that stores, transmits and yields significant quantities of water to wells and springs.

Artesian--a condition in which the static water level stands above the top of the aquifer.

Conjunctive operation--a term used to describe operation of a ground water basin in coordination with a surface water reservoir system. The purpose is to artificially recharge the basin during years of above-average precipitation so that the water can be withdrawn during years of below-average precipitation, when surface supplies are below normal.

Fault--a fracture in the earth's crust, with displacement of one side of the fracture with respect to the other. Frequently acts as a barrier to movement of ground water.

Ground water--subsurface water occurring in the zone of saturation.

Ground water basin--See page 8.

Ground water basin management--See page 9.

Hydraulic gradient--slope of the water table.

Hydrology--the origin, distribution, and circulation of water of the earth--precipitation, streamflow, infiltration, ground water storage, and evaporation.

Hydrology, ground water--the branch of hydrology that deals with ground water--occurrence, movement, replenishment, and depletion.

Mining--pumping from ground water bodies greatly in excess of replenishment.

Overdraft--the condition of a ground water basin where the amount of water withdrawn exceeds the amount of water replenishing the basin over a period of time.

Overdraft, critical conditions of--See page 3.

Percolation--the flow or trickling of water through the soil or alluvium to the ground water table.

Permeability--the capability of soil or other geologic formation to transmit water.

Pumping lift--the distance water must be lifted in a well from the well pumping level to ground surface.

Recharge--flow to ground water storage from precipitation, infiltration from streams, and other sources of water.

Safe yield--the maximum quantity of water that can be continously withdrawn from a ground water basin without adverse effect.

Saline--consisting of or containing salts, the most common of which are potassium, sodium, or magnesium in combination with chloride, nitrate, or carbonate.

Surface supply--water in reservoirs, lakes or streams; expressed either in terms of rate of flow or volume.

Topographic divide--that line on the ground surface from which water drains in opposite directions; i.e., a ridge.

Total dissolved solids (TDS)--the quantity of minerals (salts) in solution in water, usually expressed in milligrams per liter or parts per million.

Volcanics--material of volcanic origin, such as ash, cinder, lava, or basalt.

Water table--the surface where ground water is encountered in a well in an unconfined aquifer.

APPENDIX B

WORKSHOPS

Date	City
NORTHERN DISTRICT	
4/5	Susanville
4/10	Alturas
4/18	Yreka
4/26	Eureka
5/2	Red Bluff
5/3	Willows
CENTRAL DISTRICT	
4/9	Santa Rosa
4/12	Marysville
4/17	San Jose
4/23	Woodland
4/25	Stockton
4/30	Portola
SAN JOAQUIN DISTRICT	
11/23 (1978)	Bakersfield
4/16	Salinas
4/19	Turlock
4/23	Fresno
4/25	Visalia
4/26	Bakersfield
SOUTHERN DISTRICT	
4/16	Santa Barbara
4/18	Los Angeles
4/20	Coachella
4/24	San Luis Obispo
4/26	Victorville
5/10	Riverside
5/14	Bishop
5/16	San Diego

APPENDIX C

PUBLIC HEARING RECORD ITEMS

The public hearing record consists of oral testimony given at the four public hearings and letters and other documents received by the Department about the draft report material between September 1, 1979 and October 5, 1979.

Oral Testimony

Oral testimony was recorded by hearing reporters. Copies of those reports are available for viewing in offices of the Department of Water Resources as indicated below. Also below is a list of those who testified for the record.

Los Angeles Public Hearing, September 24, 1979

Copy may be viewed at:

Fifth Floor Reception Room 849 South Broadway Los Angeles, California	Resources Agency Library Room 117 1416 9th Street Sacramento, California
Those who testified are:	Tom Stetson Stanley Hatch Mike Hopkins C. Charles Evans Michael Hoover Robert Lieberknecht Joseph Gonzalez Patricia Shewczyk Joan Kerns Dale Meyer Robert Bean Virgil Duncan

Fresno Public Hearing, September 25, 1979

Copy may be viewed at:

Reception Desk 3374 East Shields Avenue Fresno, California	Resources Agency Library Room 117 1416 9th Street Sacramento, California

Those who testified are:

Howard Frick
Thomas Maddock
George Ribble
Arnold Rummelsburg
Paul Enns
Joseph B. Summers
Brent Graham
Jim Sorensen
R. C. Schafer
Bruce W. Kuebler
Roger Robb
Robert E. Leake
Keith Miller
Maurice Strands
Max Garver
Ruth McKenry

Redding Public Hearing, September 27, 1979

Copy may be viewed at:

Reception Desk
2440 Main Street
Red Bluff, California

Resources Agency Library
Room 117
1416 9th Street
Sacramento, California

Those who testified are:

Bruce Barron
Richard Stockett
Harold Stoy

Sacramento Public Hearing, October 2, 1979

Copy may be viewed at:

3251 S Street
Sacramento, California

Resources Agency Library
Room 117
1416 9th Street
Sacramento, California

Those who testified are:

R. Jack Sturla
Lloyd Fowler
Richard Dickenson
Tom Dotta
Peter Vorster
Mel Blevins
Keith Jones
Joseph Alessandri
Bill DuBois
John Mann

Letters

Letters and other documents received as part of the public hearing record may be viewed in:

Resources Agency Library
Room 117
1416 Ninth Street
Sacramento, California

The following documents were placed in the public record between September 1 and October 5, 1979:

Statewide Interest

September 25	Thomas M. Stetson Stetson Engineers, Inc.
September 28	State Water Resources Control Board Peter Rogers
October 4	Dr. John F. Mann, Jr. Consulting Geologist and Hydrologist
October 5	U. S. Geological Survey Richard Bloyd

Northern District

September 25	County of Lassen Harold Stoy, Supervisor
September 27	Shasta County Department of Water Resources Larry G. Preston
September 26	Inter-Mountain Hay Growers Association Richard A. Stockett, President
October 3	Sacramento Valley Landowners Association Kenneth Kaplan, President

Central District

September 7	North Marin County Water District John Olaf Nelson
September 11	South Santa Clara Valley Water Conservation District R. Jack Sturla, Secretary-Manager
September 11	County of San Mateo S. H. Cantwell, Jr., Director of Public Works

Central District (Continued)

September 12	City of Rohnert Park Roland L. Brust, City Engineer
September 19	Santa Clara Valley Water District John T. O'Halloran, General Manager
September 25	County of Sacramento J. P. Alessandri, Chief, Water Resources Division
October 1	Alameda County Water District Stanley R. Saylor, General Manager and Chief Engineer
October 1	Alameda County Flood Control and Water Conservation District Mun J. Mar, General Manager
October 2	Sierra County Keith Jones, Assistant Planning Director
October 2	San Joaquin County Flood Control and Water Conservation District Richard W. Dickenson, Assistant to County Counsel
October 4	South Santa Clara County Water Conservation District R. Jack Sturla, Secretary-Manager

San Joaquin District

September 5	County of Santa Cruz Gray A. Patton, Supervisor
September 18	City of Santa Cruz Frank Thomas
September 25	Kern County Water Agency Stuart T. Pyle
September 25	Statement of City of Bakersfield Thomas M. Stetson, Consulting Civil Engineer
September 25	Statement of Kern Delta Water District
September 25	Statement by Howard R. Frick in behalf of the Board of Directors of the Arvin-Edison Water Storage District

San Joaquin District (Continued)

September 25	Statement of Wheeler Ridge-Maricopa Water District presented by Arnold S. Rummelsburg, Engineer-Manager
September 25	Statement by Rosedale-Rio Bravo Water Storage District presented by Paul I. Enns, President
September 25	Statement by Joseph B. Summers on behalf of the Consolidated Irrigation District
September 25	Statement by Brent Graham of the Tulare Lake Basin Water Storage District
September 25	Statement by R. L. Schafer on behalf of Peoples Ditch Company, Lakeside Ditch Company, Tule River Association, and Carvelo Water District
September 25	Statement of Roger W. Robb, for Lower Tule River and Pixley Irrigation Districts
September 27	Dudley Ridge Water District James R. Provost, Manager
September 28	North Kern Water Storage District C. H. Williams, Engineer-Manager
September 28	Tulare Lake Basin Agricultural Water Quality Management Group R. L. Schafer, Chairman
October 2	To Board of Supervisors from Santa Cruz County Gary A. Patton, Supervisor
October 5	Kaweah Delta Water Conservation District Max Garver

Southern District

September 7	County of Imperial David Pierson, Director of Public Works
September 12	Goleta County Water District (Telegram) Robert A. Paul
September 13	Department of Water and Power, City of Los Angeles Paul H. Lone, Chief Engineer
September 24	League of Women Voters of Santa Barbara Patricia Shewczyk

Southern District (Continued)

September 24	South Central Coast Regional Commission Carl C. Hetrick, Executive Director
September 24	Statement of Main San Gabriel Basin Watermaster, Upper San Gabriel Municipal Water District, and San Gabriel Valley M.W.D.
September 25	San Luis Obispo County Supervisors Hans Heilmann, Chairman
September 26	League of Women Voters Flora Jean Nash
September 27	Santa Barbara County Water Agency James M. Stubchaer, Engineer-Manager
September 27	Montecito Water District Michael F. Hoover
October 1	Inyo County Phillip Williams
October 1	Santa Ynez River Water Conservation District Stanley C. Hatch
October 4	Montecito Water District C. C. Evans
October 4	County of Imperial David E. Pierson, Director of Public Works
October 4	Citizen of Montecito Dale I. Meyer
October 4	City of Santa Barbara David T. Shiffman, Mayor

APPENDIX D

Letters to Ronald B. Robie from Senators Nejedly and Vuich

PLEASE RESPOND TO:

☐ DISTRICT OFFICE
1655 OLYMPIC BLVD.
P. O. BOX 5267
WALNUT CREEK, CALIFORNIA 94596
(415) 934-4558

☒ SACRAMENTO ADDRESS
STATE CAPITOL
SACRAMENTO, CALIFORNIA 95814
(916) 445-6083

JOHN A. NEJEDLY
SEVENTH SENATORIAL DISTRICT
CONTRA COSTA

COMMITTEES
NATURAL RESOURCES AND WILDLIFE, CHAIRMAN
FINANCE
HEALTH AND WELFARE
PUBLIC UTILITIES, TRANSIT AND ENERGY
JOINT COMMITTEE FOR REVISION OF THE PENAL CODE
WILDLIFE CONSERVATION BOARD
JOINT ADVISORY COMMITTEE ON STATE PRISON FACILITIES AND INCARCERATION ALTERNATIVES, VICE CHAIRMAN

CALIFORNIA LEGISLATURE

Senate

October 9, 1979

Mr. Ronald B. Robie, Director
Department of Water Resources
1416 Ninth Street
Sacramento, California 95814

Dear Mr. Robie:

I understand that there has been some confusion about a bill that I authored last year, SB 1505, which added Section 12924 to the Water Code. Pursuant to that new Section, your Department has been investigating the State's ground water basins and identifying them on the basis of geological and hydrological conditions and existing political boundaries, and preparing a report to be submitted to the Governor and Legislature by January, 1980.

In recent months, questions have been raised regarding the Legislature's intent in passing SB 1505. SB 1505 originally contained a comprehensive ground water management program, generally requiring that ground water management districts be designated to manage the underlying ground water basins. This major part of the original bill, however, was sent to interim study.

SB 1505 as enacted, Chapter 601, Statutes of 1978, requires the Department, in identifying basins, to consider "political boundary lines wherever practical." The Department previously identified the State's ground water basins solely on the basis of geological and hydrological conditions (in Bulletin 118, "California Ground Water," completed in September, 1975). The requirement that the Department consider "political" boundaries in addition to geological and hydrological conditions in its identification of ground water basins was added to the Department's charge to assure that, in the event that the Legislature enacts a comprehensive management program, the basins will be logically defined. In fact, in the Final

Report of the Governor's Commission to Review Water Rights Law, which was completed after SB 1505 was enacted, the Department's investigation under Section 12924 was incorporated into their proposed ground water management legislation. In passing SB 1505, I feel that the Legislature was mindful of future ground water management legislation and intended the Department's investigation under SB 1505 to complement and provide direction to any such legislation.

I am looking forward to receiving the final report.

Very truly yours,

JOHN A. NEJEDLY
Senator, 7th District

JAN:mds

SACRAMENTO OFFICE
STATE CAPITOL
SACRAMENTO, CALIFORNIA
95814
(916) 445-4641

DISTRICT OFFICE
120 W. TULARE
DINUBA, CA 93618
(209) 591-5005

DISTRICT OFFICE
2002 N. GATEWAY
FRESNO, CA 93727
(209) 488-5541

DISTRICT OFFICE
317B No. DOUTY STREET
HANFORD, CA 93230
(209) 582-2549

California State Senate

ROSE ANN VUICH
STATE SENATOR
FIFTEENTH SENATORIAL DISTRICT
FRESNO, TULARE, KINGS AND KERN COUNTIES

COMMITTEES
AGRICULTURE AND WATER
TRANSPORTATION
INSURANCE AND FINANCIAL INSTITUTIONS
LOCAL GOVERNMENT, V. CHAIR
JOINT COMMITTEE ON FAIRS ALLOCATION AND CLASSIFICATION
SELECT COMMITTEE ON POLITICAL REFORM
CHAIR, RURAL CAUCUS

November 16, 1979

Ronald B. Robie, Director
Department of Water Resources
P. O. Box 388
Sacramento, California 95802

Dear Ron:

It was with notable dismay that I received a copy of Senator John Nejedly's October 9th letter to you where he suggested the Legislature had future groundwater legislation in mind when passing SB 1505. I can assure you that nothing could be further from my intent and, in fact, of others who reviewed SB 1505. Senator Nejedly's feeling that any investigation under SB 1505 would compliment and provide direction to future groundwater legislation is speculation, if not wishful thinking.

I analyzed SB 1505 on its own merits with the goal in mind of clarifying and identifying groundwater basins, since this information can be of great service to existing water users and water managers. At no time during committee or in other forms was it brought to my attention that this bill could be a precursor or even complimentary of future groundwater legislation. Any action that the Department were to take based on this assumption would be based on highly questionable assumptions.

Sincerely,

Rose Ann Vuich

ROSE ANN VUICH

V/g/sp

80136—950 12/79 6M OSP


CALIFORNIA DEPARTMENT OF WATER RESOURCES
THE RESOURCES AGENCY